DIESEL EQUIPMENT SUPERINTENDENT

The man responsible for the selection, performance and availability of his company's diesel equipment

November 1961

press run — **22,500**

FLEET • CONSTRUCTION • INDUSTRIAL

this month's

EQUIPMENT SUPERINTENDENT

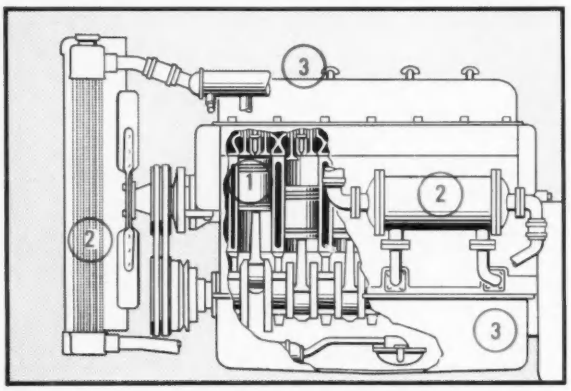
C. B. "RED" MORRIS

Maintenance Superintendent–Santa Cruz Lumber Company

Formerly **diesel power**

TEXACO DIESEL DATA

HOW TO REDUCE ENGINE DEPOSITS AND LUBE OIL CONTAMINATION



THREE MAIN CAUSES OF ENGINE DEPOSITS are 1) incomplete combustion, 2) inadequate cooling, 3) poor crankcase ventilation.

Keeping diesel lube oil clean is one of the most valuable types of preventive maintenance, but it's a very complex problem, with many aspects. This is a simplified rundown on three major types of deposits that may form in diesel engines, and some of the maintenance techniques that work best to prevent each type.

Engine deposits; three types, three causes

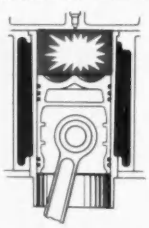
The usual diesel engine deposits may combine two or all three of these basic types:

1. Oil-carbon deposits, composed of oil mixed with the soot of incomplete fuel combustion.

2. Oil-oxidation sludge, composed of oil mixed with oxidized matter resulting from the combining of some of the oil with oxygen at temperatures between 200-500°F.

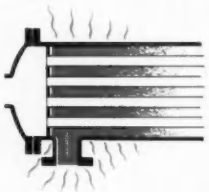
3. Oil-water sludge, composed of used oil mixed with water and other substances, such as soot or dirt, which prevent easy separation of the oil from the water.

Minimize oil-carbon deposits by improving fuel combustion



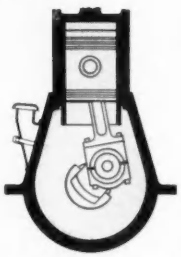
To improve fuel combustion: check fuel injection to make sure each cylinder is getting the same amount of fuel; make sure the engine isn't overloaded; check air-intake system for restrictions; increase cooling system temperature; eliminate hard pulls at low rpm; or use lighter, higher-cetane fuel. Other methods for reducing oil-carbon sludge are: use detergent oil; renew piston rings and liners; improve oil purification; drain oil more frequently.

Minimize oil-oxidation deposits by reducing oil temperature



To reduce oil temperature: check cooling system, fan, water pump, radiator; check for deteriorated hose or loose connections; check for scale in water jackets; install lower temperature thermostat; clean the oil cooler, or consider replacing with a larger one. Other methods for reducing oil-oxidation sludge are: use heavy-duty oil; either flood hot spots or prevent oil from reaching them; drain oil more frequently; use higher-cetane, lower-sulfur fuel.

Minimize oil-water sludge with warmer or better-ventilated crankcase



To raise engine temperature: warm up engine more quickly, check thermostat in cooling system, use radiator shutters; raise jacket temperature, reduce oil cooling, insulate crankcase, remove fan during severe cold weather. Crankcase ventilation can be increased by placing ventilation outlet in air stream or in exhaust ejector, or by connecting to engine air intake system. Other methods of reducing oil-water sludge are: keep oil exceptionally clean by improving purification, permitting water to separate; improve steadiness of load by reducing amount of idling, light-load operation and number of starts; eliminate water leaks; install reclaimer or centrifuge in addition to filter to remove water from oil; drain oil more frequently.

Keep in touch with your lubricant supplier

You've probably noticed that the recommended cures for different types of sludge are sometimes contradictory. Since sludge in most engines may have two, or even three, different causes, your first move in solving a sludge problem should be to consult an experienced lubricant supplier. The proper application of these recommendations depends on a thorough analysis of the engine and its operating conditions, and the man who can do this job best is one who knows, from experience, which compromise will work best.

Texaco has many years' experience fueling and lubricating diesel engines of all sizes, in all types of operations. If you need help or information, call the nearest of the more than 2,300 Texaco Distributing Plants, or write Texaco Inc., 135 East 42nd Street, New York 17, New York.

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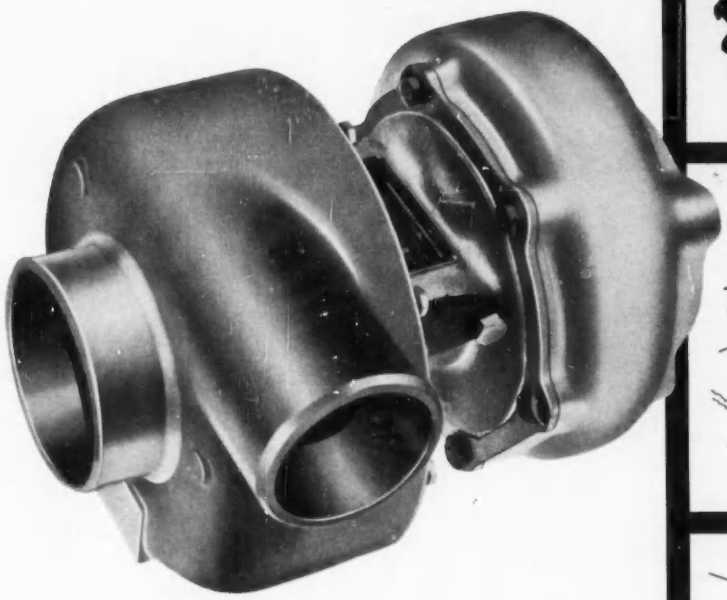

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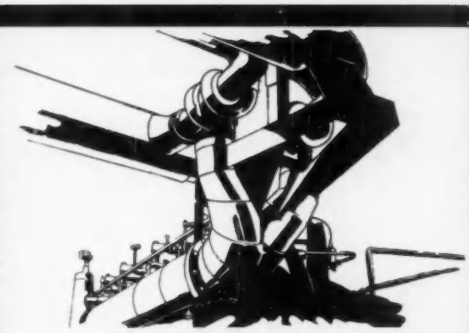

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WHAT IT DOES—
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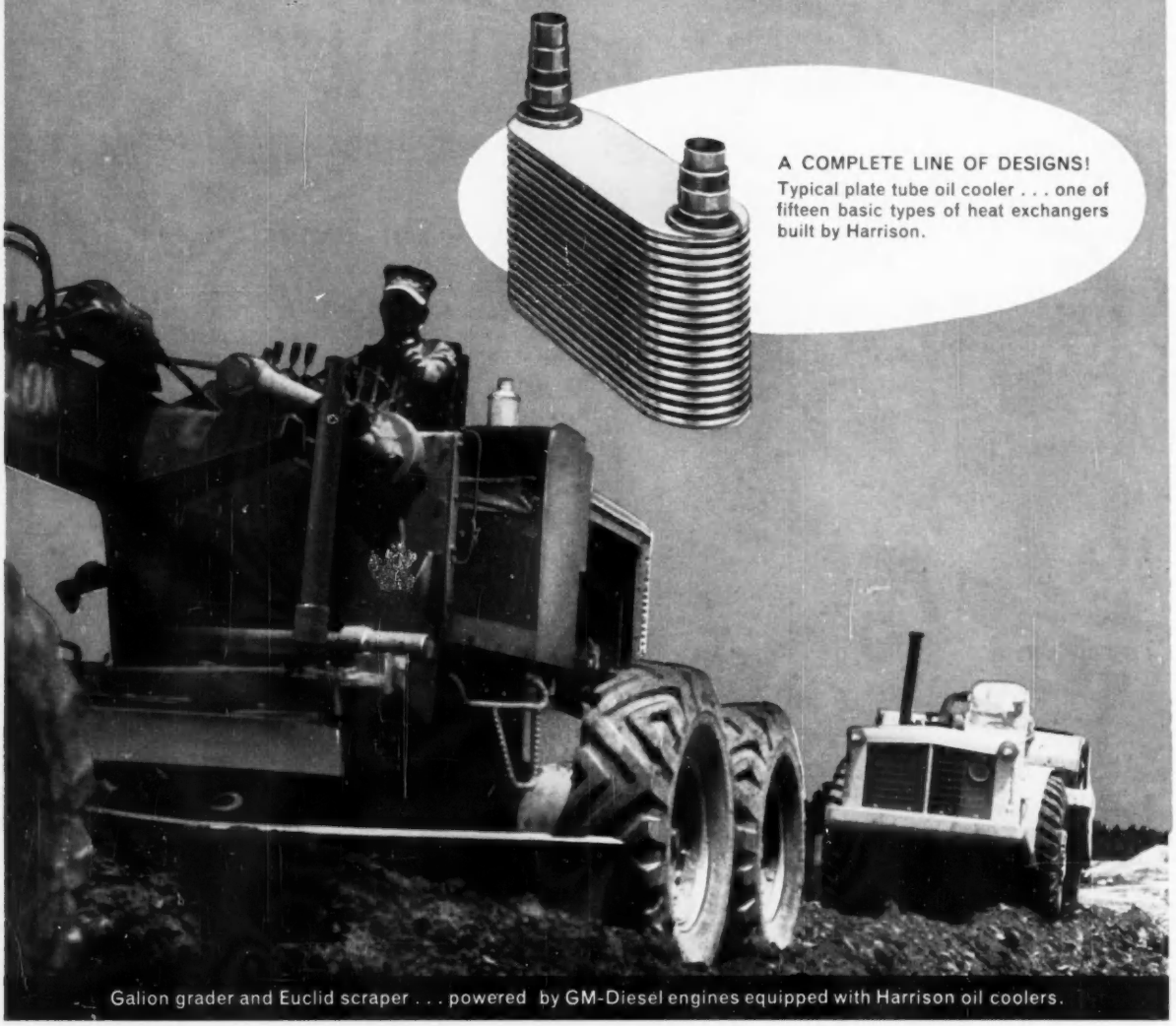

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The man responsible for the selection, performance and maintenance of his company's diesel equipment

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BPA

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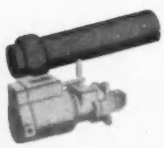

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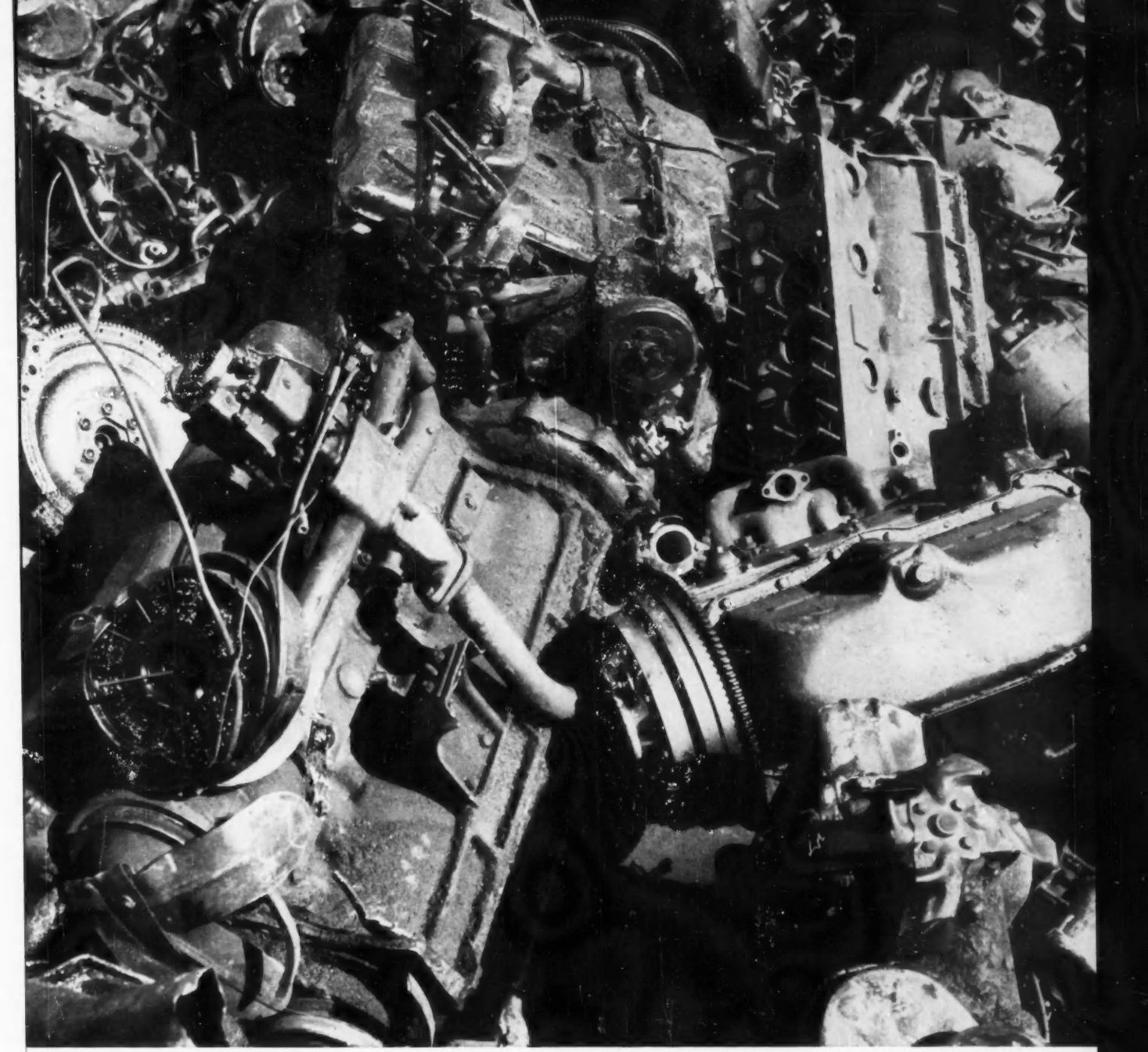

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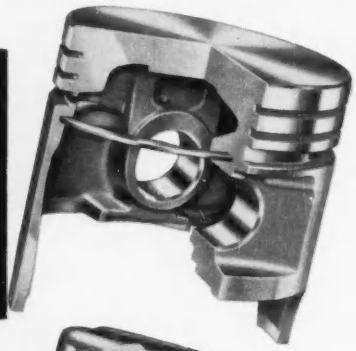

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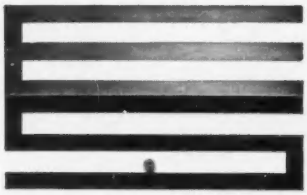
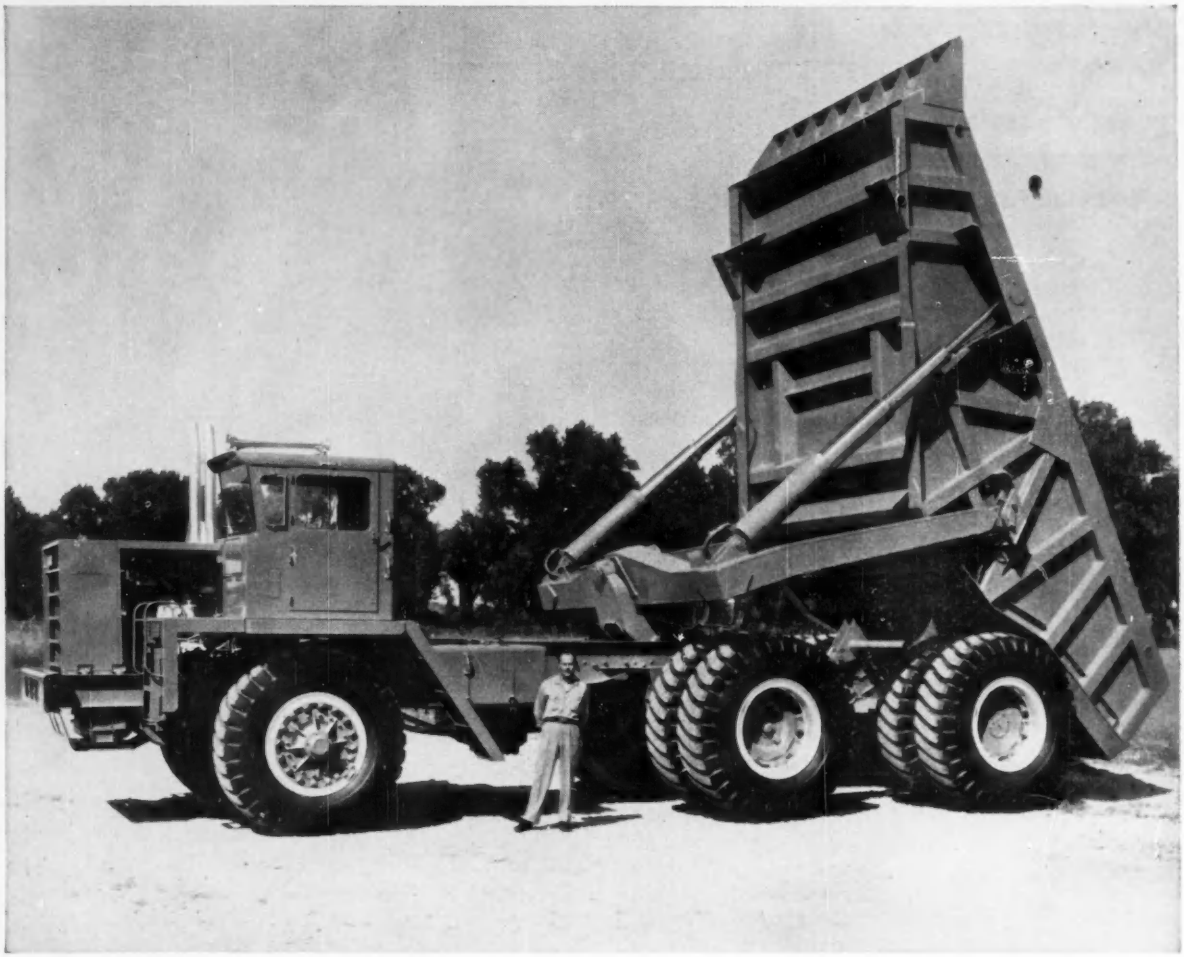


EDITORIALLY SPEAKING

Make-Do Doesn't Pay

You can learn a lot from everyday happenings . . . if you're alert to grab the message. One idea punched home recently is a good example of what we're driving at. Like most home owners we get involved in the redecorating bit. This time it was the kitchen and ceiling repair of hurricane water damage was needed . . . just a simple joint taping job. No need to go to the hardware store . . . some tape and compound were left in the cellar from when the house was built six years before. Twenty minutes and the job was done. Came morning and the tape was curled and pulled away. Next night, 20 minutes to clean out the joint, 20 minutes to re-do the job, a good hour to clean up the kitchen. Next morning the tape was curled again. Our keen mind then began to suspect that something was wrong. If we'd had a lick of sense, we'd have thought about the effects of age and dampness on the compound in the first place. Investment of a couple of dollars for new compound . . . plus the time for re-preparation, re-do and cleanup . . . solved a problem that could have been avoided with a little sense. Got to thinking about this in relationship to business and wondered how many people are repeating this basic mistake with respect to their equipment . . . running machines that are over the hump . . . patching here and there when a complete rebuild would save them money. We've seen a lot of equipment being used that we suspect is costing the owner more to run than he would have to lay out to amortize new machines. Of course, we can't really tell but you can! That is if you're keeping adequate records. From these you should be able to tell what the operating costs are per hour or per mile. You can tell what it has cost for the past six months, the past year. Compare these figures with the cost of operating a new piece of equipment. We've seen actual cases where the older equipment was costing almost twice as much, not including cost of downtime! With high utility, wasted operating costs add up to a lot of dollars . . . often enough to amortize a new piece of equipment. Even if some capital investment is needed, balanced against this is higher productivity of modern equipment, higher availability, improved safety factors, greater operator satisfaction and, of course, you've up-graded your equipment and it has a higher value. Now is the time for sound business management; without it you're headed for the cleaners. You must have the facts and analyze them if you're to make sound decisions. You'll find that make-do doesn't pay. By the way, the ceiling turned out okay . . . wife liked the job.

B.P.E.



Ni-Resist parts help cut operating costs in the world's largest production model truck

Ni-Resist* diesel engine parts withstand high operating temperatures ...deliver long, cost-saving service in this 700-hp turbocharged giant

This KW-Dart 95-tonner has a carrying capacity of 48 cubic yards. Powered by a 12-cylinder, 700-hp Cummins Turbodiesel** engine, this giant is designed to haul bigger loads at lower cost.

To achieve peak efficiency and fuel economy, the heavy-duty diesel operates at temperatures above 1200°F. And to assure long service life of engine components exposed to these high temperatures, Cummins specifies Ni-Resist nickel-alloyed austenitic cast iron.

Ni-Resist manifold is indestructible. Ni-Resist iron withstands hot, corrosive exhaust gases that tend to warp and crack ordinary irons. That's why Cummins considers the Ni-Resist manifold to be virtually indestructible. For the same reasons, the rugged turbocharger casing is also made of Ni-Resist iron and can be expected to deliver years of trouble-free service.

Ni-Resist piston ring inserts have excellent wear resistance, can take the pounding punishment of high-compression operation. They prevent power-wasting "blow-by" and avoid needless oil consumption.

If you build or use heavy-duty diesel engines, specify engines with Ni-Resist parts. You'll be specifying power *and* economy.

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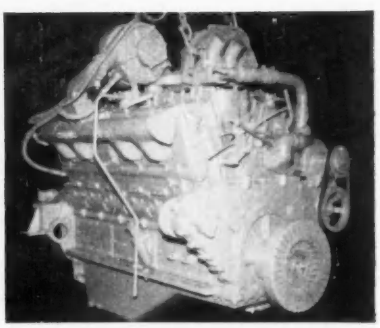

700-hp Cummins Turbodiesel delivers maximum power at lowest operating costs—uses Ni-Resist austenitic iron parts to assure long service life at high temperatures in this efficient turbocharged engine.

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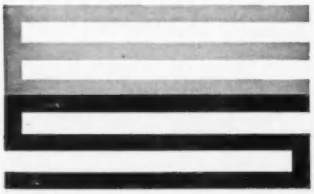


HIGHLIGHTS

GM CONSOLIDATES OPERATION OF CLEVELAND DIESEL AND EMD

General Motors Corp. is consolidating operations of Cleveland Diesel and EMD . . . The consolidation will permit intensified research and improved servicing of customer's equipment . . . Consolidation is expected to take about one year for completion.

TRUCKERS ACCUMULATE DATA FOR NATIONAL DEFENSE

The Research Department of ATA is developing and accumulating data for the Department of Defense, to better determine the transportation needs during a period of emergency . . . Trucks may well be very important, since they do not necessarily need a road, but can roll over meadows, pastures and back alleys, if they have to.

HOW IMPORTANT GOOD MAINTENANCE REALLY IS

A recent report from ATA Foundation's department of research and transport economics stated that a half-cent savings per intercity mile on maintenance expenses would have increased the 1960 net income before taxes from $109 million to over $150 million for Class I and II carriers (firms with over $200,000 gross).

HIGH-SPEED ROADS HELP THE BUS LINES

For the first time in history, bus lines in intercity service are handling more passenger traffic than the railroads . . . because of the new road network, schedules can be speeded up, making it possible to go faster by bus, from some points, than by jet plane . . . The trend is expected to continue, even accelerate, as roads get better and airports are located further out of town.

USERS PAID $4.5 BILLION IN EXCISE TAXES

In 1960, highway users paid $4.5 billion in federal automotive excise taxes, over and above all other taxes.

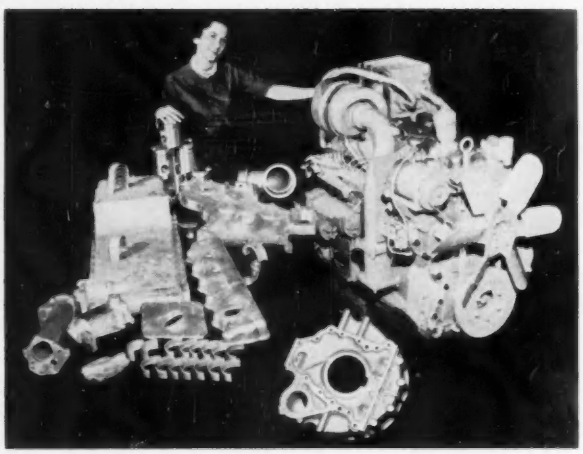
TRUCKERS' FINANCING PICTURE CHANGING FOR THE BETTER

Banks and other financial institutions are aware of the maturity of the trucking industry, and of its bigness, too . . . Stronger trucking companies can finance equipment purchases on signature alone, and the good experiences of these lenders is making it easier for smaller operators to arrange for similar financing . . . the picture is getting better every day, making a lot of new equipment-upgrading purchases a lot easier.

DIESEL USE IN SWEDEN ON THE RISE

Registrations of new diesel trucks in over 3 ton metric capacity (about 6600-lb) has been on the rise steadily and strongly in Sweden. Starting from the number registered in 1957, 1958 saw a 13% increase. This was followed in 1959 by an additional increase of 19%. Last year, registrations jumped a full 23%.

With Generator Set
Unusual use for a diesel generator set is on a specially constructed snow melter being inspected by New York City officials. Truck, designed by Peabody Engineering Corp., uses 60-kw Allis-Chalmers generator that powers pumps. Snow is loaded aboard, melted in truck, pumped into sewers.



Aluminum for Cat 1673
Caterpillar's lightweight model 1673 engine uses more than 150 pounds of aluminum for housings, brackets, — everywhere reasonably possible. Estimate is that this saves at least 250 pounds of dead weight. The 1673 is an in-line six rated 220-hp @ 2200-rpm. Weight/horsepower ratio is 9.4-pound/hp, meaningful for an engine in truck service.

GM 4-53 Saves $5/day in Fuel
J. T. Wages, of the Wages Lumber and Kiln Drying Co. of Decatur, Ga., reports fuel savings up to $5 per day after the Dixie Engine Co. of Atlanta repowered the company's Gerlinger fork lift with a GM 4-53 diesel. In addition, steady flow of high-torque eliminated bogging down, saving towing and downtime.

Cal-Standard's Canal Sealant Hauled by P-I-E Tankers

A canal sealant to reduce water loss through seepage was hauled by P-I-E's Bulk Commodities Division for a demonstration. The haul was from California to Wyoming—44,000 gallons for 1000 miles. Precise delivery time and discharge at specified rate was accomplished with standard equipment and regular service personnel.

Equipping "Cuss II"

Construction of equipment for the world's largest free-floating drilling vessel, "Cuss II", is underway. "Cuss II", will be capable of drilling a 20,000-ft hole in 15,000-ft of water. The vessel will be equipped with six General Electric GT602 drilling generators powered by 600-hp Cummins VT12-700 engines. Eight GE-752 drilling motors will be used, along with a KG189 control panel and a KC193 drillers console. Four of the motors will be used for two main mud pumps, one for the mud mix pump, two for the drawworks and one for the rotary table.

Nordberg Celebrates 75th Year of Progress

Nordberg Manufacturing Company is celebrating its 75th anniversary. Looking back over the years, the Nordberg company has evolved from a third-floor one-product production facility (the product was a cut-off governor for steam engines) to the present industrial complex. Incidentally, Nordberg completed production of its first diesel engine in 1912, and many of the engines that were produced not too many years later are still cranking out power for owners who've had more years than they bargained for to amortize their initial investment.

Need Seen For Standardization of Truck Maintenance Records

Phase three of a continuing study on truck maintenance costs being conducted by the Department of Research and Transport Economics of the American Trucking Association concludes that standardization of maintenance records is needed before trucking firms can determine the efficiency of their maintenance operations. A second conclusion is that there is an "increasing trend" among trucking companies to favor a "demand repair" rather than a "scheduled repair" basis for maintaining major vehicle components. The report goes on: "This trend seems to be stimulated in part by better equipment for analysing vehicle performance in the shops and improved techniques for detecting potential failure". What it boils down to is that if demand repair, rather than scheduled repair, seems to be attractive, you'd better make pretty sure you've got enough test equipment (and men to use it) to prevent a lot of unscheduled failures.

Greyhound Ordering 300 Buses from GM

Greyhound, which ordered 225 single-level buses earlier in the year, has ordered an additional 300 from GM at a total cost of $13.5 million. They will be delivered at the rate of 60 a month.

F-M Gets Contract

On a bid of $448,680, Fairbanks, Morse & Co has been awarded a contract to furnish the City of Sebring, Florida, a diesel generating set. This 2800-hp slow-speed generating plant is the third identical and the sixth F-M engine ordered for this plant.

Michigan 180 Tractor Dozer Now Has Optional Engine

As announced by the Construction Machinery Division of Clark Equipment Company, the Michigan model 180 Tractor Dozer will now be offered with either the 162-hp Cummins C-175 engine or the 170-hp General Motors 6V-53.

Builds Service Facility

Ringsby Truck Lines, which has just added a dozen new-type refrigerator trailers to equipment orders totaling $2.5 million in the past four months, is building a service facility in Los Angeles large enough to handle 500 tractors and 1000 trailers. It will handle vehicles of Ringsby, Frontier Transportation and Arizona Pacific Tank Lines.

Purolator Awarded Contract for Multi-Fuel Engine Filters

Purolator Products has been awarded a $154,000 contract covering the custom design and production of fuel and lubricating oil filters to be used on a new multi-fuel engine developed jointly by Army Ordnance and Continental Motors. These filters will be double-element units.

Complete Truck Center

Stewart & Stevenson's San Antonio truck center does its own engineering and design work with respect to special parts, treating each truck as an individual piece of equipment. Fully-equipped with the most modern equipment, the center has developed a fool-proof production technique. Part of this is a complete condition report on the vehicle before work is started, followed up by a complete parts list after work is completed. Good way to prevent misunderstanding, and help the trucker get the right parts when he needs them.

Test Lab Simulates Field

Clark Equipment Co's Automotive Division engineering test laboratory is set up to simulate conditions as they exist in the field. The lab will test and evaluate Clark's line of mechanical and hydraulic transmissions and torque converters. Test results are available within 48 hours, eliminating as much as 75% of the time-consuming field testing required prior to the new facility.

Automatic Paver Control Lays Glass-Smooth Road

A new control system developed by Minneapolis-Honeywell Regulator enables road pavers to lay perfectly smooth mats automatically, regardless of rough or irregular roadbeds. It controls both grade and slope, and can be ordered on new equipment or retrofitted to an older unit.

ASME Moves

The American Society of Mechanical Engineers will move its headquarters offices to the recently-completed United Engineering Center on United Nations Plaza, New York. Address is 345 E 47th St.

PEOPLE, PLANTS, PLACES

F-M Names VP

Frank C. DiLuzio has been named vice president-engineering for **Fairbanks, Morse & Co's** Beloit group. He will have overall responsibility for engineering within the group, as well as for product planning and diversification.

Frank C. DiLuzio

New Plant for Yates

Yates-American will soon move its offices and manufacturing facilities into a modern, highly-efficient 50-acre plant site located in Roscoe, Illinois, just 3-miles away from the old plant location.

Lister Names Engineer

Lister-Blackstone announces the appointment of **J. E. Barthmaier** as chief marine advisory engineer.

Railroad Industry Sales Pioneer Dies

Otto F. Brookmeyer, railroad industry sales pioneer, died at the age of 72 in Illinois Central Hospital. Credited with introducing diesel motive power to U.S. railroads, he was formerly general sales manager for General Motor's Electro-Motive Division. Beginning his railroad career in 1905, he joined EMD in 1924, directing sales of more than 700 diesel locomotives, including Burlington Railroad's Pioneer Zephyr, which made the famous dawn-to-dusk non-stop run from Denver to Chicago in May, 1934.

Sales Dir. for Cummins

Cummins Engine Co has named **Marion C. Dietrich** as director of sales (parts and special products) and member of the company's executive committee. He will be responsible for parts sales and distribution, and special product sales of the company's domestic subsidiaries.

Marion C. Dietrich

ABA Corp Manager

American Bosch Arma Corp has named **Leslie R. Sarna** manager of planning and administration for the commercial sales division, headquarters in Springfield, Mass.

Sealed Power Plant

Sealed Power Corp announced plans to build a new casting and machining plant in the Muskegon area. Initial investment will be in the order of $1,500,000.

Kent-Moore Names Sales Executives

The **Kent-Moore Organization** has announced the appointment of **H. P. Cardon** as general sales manager for the service tool division. He succeeds **John M. Seanor,** who resigned. **K. W. von Gruben,** former chief contact engineer, succeeds Cardon as assistant general sales manager. These appointments are in line with a policy of all vehicle manufacturer contacts being handled by the sales department.

PCC Production Started

Perfect Circle Corp's new piston ring foundry at Rushville, Indiana, has well begun production operations. The $3 million plant is a highly-mechanized modern production facility that was built to provide increased production capacity.

Electric Autolite Names Mgr.

Electric Autolite's electrical products group has named **Donald M. Brown** product Manager. His headquarters will be at Toledo.

Bunting Brass & Bronze Creates New Department

Bunting Brass and Bronze Co. announced creation of a new precision plating facility, and that it will be headed by **Elmer T. Blackney.**

Henry B. Sirotek Dies

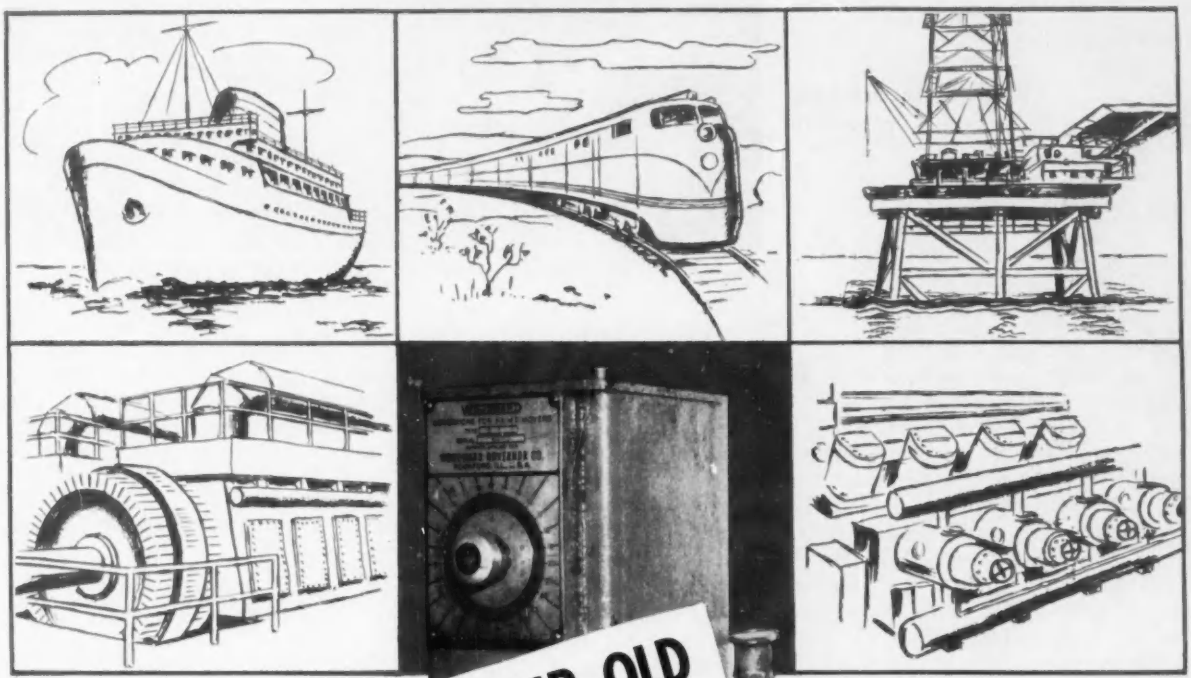
With deep regret we announce the untimely passing of **Henry B. Sirotek, Illinois Auto Electric Company,**

Henry B. Sirotek

Chicago, on Friday, October 13, 1961. Long involved in several phases of the diesel industry, Henry gave unstintingly of his time and talent to promote a bigger and better industry. For one thing, he was a co-founder of the **Association of Diesel Specialists** and was its immediate past-president, serving during the years of 1959 and 1960.

Those who met him in the course of business activity soon got to know him as a good friend . . . someone to like, respect and admire. We include ourself among these and with the host of others, feel a deep sense of personal loss.

BACK ON THE JOB AGAIN...



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THIS MONTH'S EQUIPMENT SUPERINTENDENT

C. B. "RED" MORRIS
Maintenance Superintendent
Santa Cruz Lumber Company

"Red" and "Cat doctor" Curly Pokriots replace cable winch on a Cat.

"After spending two days trying to get the diesel tractor to run, someone told me I should've fueled'er with diesel fuel instead of gasoline!"

C. B. "Red" Morris' introduction to diesel maintenance work was not an uncommon experience in the early 'forties. "Red" had "inherited" his first diesel engine job on a logging road deep in the virgin redwood country 80 miles south of San Francisco.

Standing on the same spot alongside the logging road twenty years later, "Red" confessed that he had learned a lot in the intervening years but that the job had the same goal.

"We've got to keep that mill fed," muttered "Red". "Our Cats and logging trucks are all diesel now but they still have to be repaired, serviced and replaced."

Maintenance superintendent "Red" Morris of the Santa Cruz Lumber Company, working with his "Cat doctor" Corly Pokriots had just finished replacing the cable on a Caterpillar cable winch.

"This is the same identical spot. Twenty years ago I was stampin' and fumin' around here, smoking cigarettes and cursing the day the damn diesel was invented. By all rights me and that tractor should have both blown up before I found out diesels don't burn gasoline."

A lot of things have happened to the logging industry in the West since the 'forties. By far the biggest change, however, has been the electrification of the saw mills and the dieselization of the logging trucks, yarders and tractors.

"Logging is only part of our business. Maybe not even half our expense." Santa Cruz vice president Don Ley spun his small sedan around the curves of the dirt road winding for over 25 miles back through Santa Cruz lumber's 12,000 acres of virgin timber. "At least 50% of our logging costs go into road construction.

Cummins-powered track loader swings redwood logs up to 40-ft long onto Cummins-powered logging truck for trip to sawmill. This loader may stay in woods for years.

"We cut costs by stretching the working life of dieselized equipment. The age of our equipment proves this. Equipment life like this, and the attendant savings, would be impossible without 'Red' Morris. He's an important part of our administrative team."

Don Ley
Vice President
Santa Cruz Lumber Co.

It's rough on machines when "layouts" have to be prepared.

That's the big reason we have so much big equipment."

There's nothing unusual about these figures. Santa Cruz Lumber is typical of most logging firms, though it's rated as only medium size. They log and mill about 12 million board feet of lumber a year, 85% of it redwood, the rest fir. Tremendous fluctuations in lumber demand make the market exasperatingly competitive.

"We not only compete with all sorts of new building products such as aluminums and plastics," notes Ley, "we compete with weather conditions across the country. If they have an early winter in our marketing areas, building stops. If redwood fencing becomes the rage, we can be bowled over with orders six months later. We have to be like a rubber band."

What does all this have to do with "Red" and diesels and maintenance problems?

"We can't plan long term production efficiency," responds Don Ley. "You don't just run out in the woods, cut a tree and saw it into boards for delivery next week. We try to hold an inventory of lumber we think can move, then try to salvage profits out of efficiencies in other areas. Equipment costs and maintenance is one of the big fields where these savings can be made."

The relationship between pieces of equipment and number of people on the pay roll at Santa Cruz Lumber points out the importance that equipment maintenance cost savings can play in the logging industry. Santa Cruz has 45 to 50 men working in the mill and in the woods. They are backed up by over 80 pieces of equipment, including enough big Caterpillars scrapers and graders to supply a fair-sized excavation contractor. The list includes five Caterpillar D-8's, a pair of diesel graders, a diesel scraper, diesel yarders, diesel compressors. In addition there are three Cummins-powered Kenworth's in the woods and three others used for long haul work on the highway. Some of this equipment—pickups, flat-beds and fork lifts—is used in Santa Cruz Lumber's remanufacturing plant and retail outlets in nearby Santa Cruz, but most of it is, in one way or another, directly serving the logging and saw mill end of the operation.

"Red" Morris acknowledges that other industries may be rougher on similar pieces of equipment than is the logging industry. But he adds that loggers have a few unique problems such as the omnipresence of limbs and branches and the threat of falling trees that present some special equipment challenges. Most of all, he believes equipment inaccessibility when in use in the logging industry presents frustrations without parallel elsewhere. In this he is probably right.

Unlike highway contracting firms, loggers build their roads for the sole purpose of getting logs to the mill. This may mean a main road complete with bridges, easy grades, wide curves. More often this means 15% to 20% trails through the scrub brush and etched into the 1:1 slopes of forested mountains. Once it's worked into this area, this dieselized equipment—bulldozers, track loaders, tractors specially equipped with logging arches—remains in the woods for a year or more, where it is periodically fueled and serviced by four-wheel-drive service equipment.

Because most of this heavy construction-type machinery is used for making roads and "lay-outs" for the fallen trees, logging firms such as Santa Cruz Lumber look upon the equipment as only indirectly responsible for timber production. Understandably, they try to hold these huge indirect costs in line with the industry's profit picture.

This is always reflected in a lumbering industry's maintenance program. Not too long ago many of the lumbering firms couldn't see a justification for skilled diesel technicians, PM programs and well-equipped repair shops. Now the picture is changed. There's hardly a logging firm worthy of the title that hasn't become maintenance conscious and doesn't include on its payroll an equipment superintendent with far-ranging responsibilities.

In "Red" Morris, Santa Cruz Lumber has one of the best in the business—and one of the most experienced. He started driving trucks when he was 15, came into Santa Cruz Lumber in 1941 when Santa Cruz took over the contract trucking firm for which "Red" worked.

"Those were days when logging truck drivers earned their salt," reflects "Red". "I learned the ropes driving Packard-powered logging trucks with solid tires up and down these mountains. I've seen the bottom of about every piece of logging equipment that's been in the area during the past three decades."

With increasing mechanization, lumber management not only had to find the technicians who could keep the machinery producing at a profit, but also had to delegate responsibility for keeping up with ever newer equipment, parts and accessories. Alternately, by default and by selection, the maintenance superintendent fell heir to this job, too.

"We would buy neither a set of wrenches nor a $50,000 tractor without getting "Red" to help us decide what was our best buy," states Don Ley. "He's the only man that can see the entire equipment picture.

We may know we need a tractor in the woods or another logging truck. But the big decision about which unit to buy has still to be made. Initial cost isn't always the big concern. It's the maintenance, the reliability, the availability of parts, that affect our decision to buy or not to buy. "Red" is the only man who could give us such objective advice."

Between overseeing the repair and maintenance of the equipment and handling equipment and supply selection and purchase, "Red" leaves little doubt about which field he enjoys most. He's a mechanic, and is proud of it. But he's enough of a job manager to see the significance of his other job, too.

"I talk to lots of equipment representatives," reflects "Red". "It's about the only way to keep up with lots of developments. I make my own decisions about what to buy, how much to hold in stock. I have to keep my finger on the purchase of everything from a 45¢ copper fitting to a $45,000 bull dozer. I just accept this as part of my job, like keeping up these PM cards."

A complete and thoroughly up-to-date equipment maintenance record makes up "Red's" PM file. This, too, he takes care of, usually late in the afternoon after the rest of the men have left.

This he looks upon as an alarm system and the best insurance the company owns. It's the only way he can hold to proper maintenance procedures with equipment scattered around the 12,000 acre spread. Time and again it has dramatically forecast equipment breakdown in time to allow redeployment of equipment in the field, and in time to get the ailing rig into the shop.

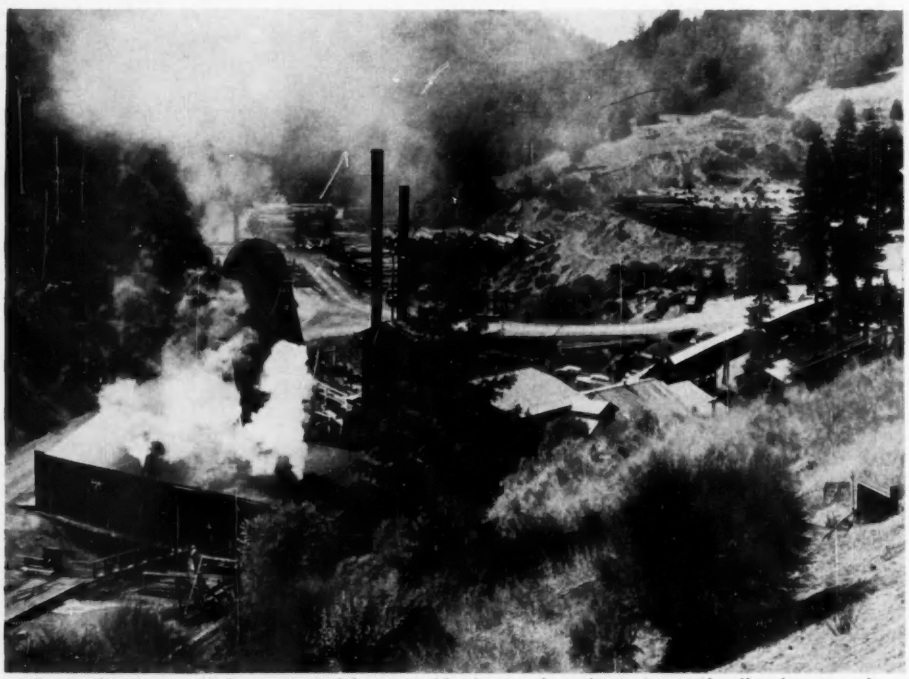
Does either top management or "Red" foresee a specific payoff to Santa Cruz Lumber for all this work?

Diesel-powered log handling requires complicated equipment. Maintaining it and stretching its life is "Red" Morris' job.

"The average age of our tractors is 15 years," observes vice president Ley. "We have one R D-8 Caterpillar that's been on the job for 27 years. Equipment mileage like this tells us we're staying away from those big capital investments that can flatten you when competition gets rough."

"Red" Morris points to the fleet of trucks to further substantiate the case for a strong PM program, even in the logging industry.

"We have over 800,000 miles on some of our Cummins-powered line rigs. These started out as HB-150's. We converted them to HR-165's, and converted them again to NH-220's. It's cost a lot to keep this program running here in the woods, but it's paying off when you see us stretching our investment out like this."

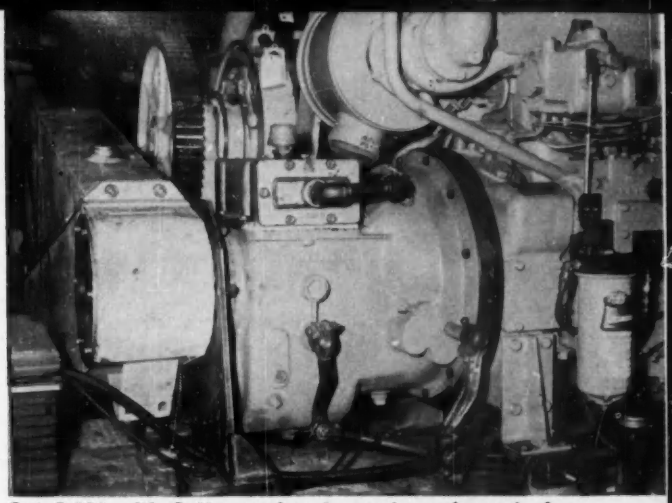


Santa Cruz' sawmill is supported by over 80 pieces of equipment, mostly diesel-powered.

Getting the right power team

by R. P. Wadlington
Cotta Transmission Co.

Tips on matching engine and driveline to the job . . . and to each other. Pay-off is top efficiency and lower costs.



Cat D-320 with Cotta gearbox to meet requirements for multiple drives, clutch, control for drive selection.

You'll get most efficiency out of a piece of driven equipment with the proper engine coupled by proper driveline. You'll save money on operating costs, too.

A diesel engine likes to work at its design speed and load. Correctly geared, it will produce full-rated power, use less fuel per horsepower and keep maintenance costs low.

You may want to change your driving equipment for any one of several reasons. Perhaps it was marginal to begin with. You may want to rearrange the drive to suit a new job or a different location. Or you may want to do additional jobs with a single power source. In any case, you should analyse your requirements to come up with the most efficient and least costly arrangement.

What's Involved . . .

Your driven equipment operates at a torque input and speed established by its manufacturer. For best performance stay with these ratings. Thus, the first requirement is an engine that produces enough power to do the job. The second is a driveline with proper output speed and capacity to handle the power.

Matching optimum engine speed to equipment's specified input speed usually requires reduction gearing. In some cases, you may need step-up gearing. In fact, building up a driveline can present you with most of your variables.

Is your power transfer straight-through or offset? How about disconnect: do you need a clutch? Maybe you'll want more than one gear ratio, which will require sliding gears and provision for shifting. Maybe you'll need a reverse gear, too.

Then there's the power takeoffs. How many do you need, and where do you need them? How many with engine rotation and how many with counter-rotation. What load will these PTOs be carrying? First step is to determine what you need.

Once you know the driveline you want, start thinking about its type of service – what we call its service factor. The rating for a reduction gear used for pumping service will not be the same as for its use in a rock crusher with its high shock loading. We, for example, show the capacities of our reduction gears for three service factors: uniform load, moderate shock and heavy shock (See Fig. 2). Note that rated capacity is determined by the service factor and the torque multiplication as determined by gear ratio. Capacity is stated in pounds-feet of torque.

(To convert horsepower to torque, multiply the horsepower by 5250, and divide the product by the rpm.)

With a specific application in mind, charts of the type shown in Figs. 1 and 2 for the specific items being used will enable you to determine that driveline capacity is adequate for your application.

A Typical Case . . .

Let's work through the charts with a typical problem. As an example, we'll assume you're repowering for a simple crushing operation with no power takeoffs. You require 1000-lb/ft input torque for the crusher at 500 rpm, and you have a specific engine in mind. Let's pick out the gears.

Go to the chart labeled figure 1, selecting the service factor that matches your operation. Chances are your shock loadings will be heavy, and the machine will be in operation 8- to 10-hours per day. This indicates a service factor of 2. The other thing we need to know is the reduction gear ratio.

Look at the specs for your engine (they're available from the manufacturer). What is optimum rpm? 1500?: let's use it. To arrive at reduction gear ratio, divide engine rpm (1500) by the required input speed (500). Gear ratio is 3:1.

Now we're ready to evaluate the capacities of the driveline components. We show the capacities of our components in a chart that considers both the service factor and the gear ratio, with the result given directly in engine torque. We have a separate chart for each component, so be sure you have the chart for the one you're working with. In this example, lets try our GR-16 reduction gear (capacity chart shown).

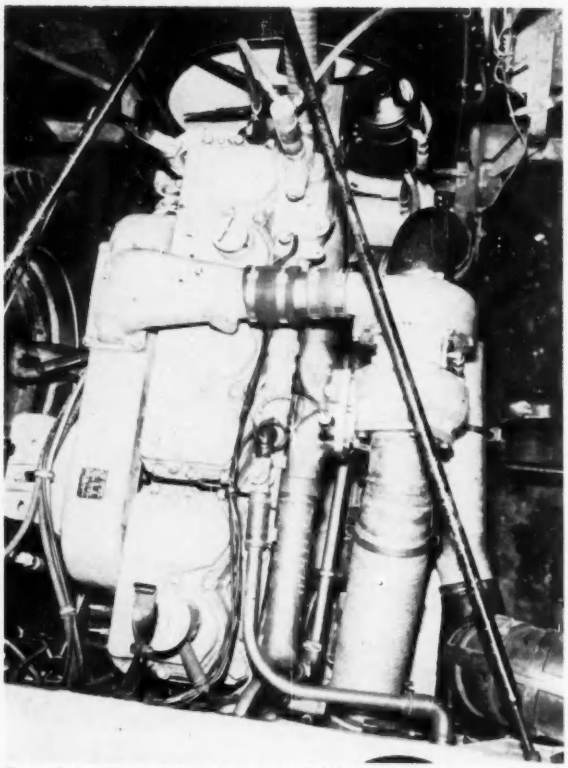
After locating your service factor (2) at the bottom of the chart go up the grid line until it reaches the curve plotted for your service factor. Stop where the lines intersect and, going directly to the left of where you stopped, read the torque value for that point. In the example of your crusher this is 1000-lb/ft.

Is this enough? Go back and check your engine's torque curve. The GR-16 reduction gear is suitable.

(Continued on page 24)

Kit Turbocharging on the Move!

Jenkins Company uses AiResearch turbocharger as basis for complete low-cost retrofit kit practical for user installation.



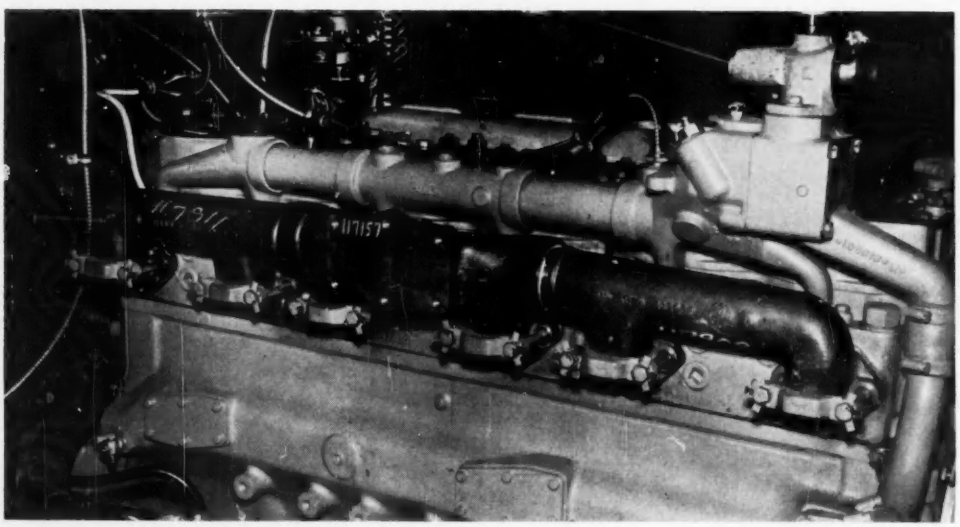
Top view shows completeness of kit and neatness of installation. Ducting, bottom right, is hard-to-break rubber.

Do-it-yourself turbocharging is big business in the West. A Los Angeles firm—the J. T. Jenkins Company—has reportedly sold over 500 turbocharger kits over the past three years to line haulers in the eleven Western states. Most of these kits have been installed by the fleets' maintenance departments.

To the user, kit turbocharging has meant significant reduction in initial costs to get turbocharged performance and benefits. Where turbocharging has been undertaken primarily as an economy effort—and this encompasses at least 90% of all kit purchasers—this reduced initial cost has played a dramatic part in the rapid growth of this little-suspected market.

Currently the most popular kit, the Jenkins package backs up purchaser anticipation with a well-known turbocharger which, significantly enough, doesn't appear in kit form under an off-brand name. It's the AiResearch Turbocharger, produced by Garrett's AiResearch Ind. Div.—now the T-1107, though pioneering work was done with the T-14 Series.

What the Jenkins firm has done has been to manufacture and package the assorted adaptors and gaskets, along with a by-pass oil filter and the turbocharger. Installation instructions come with the kit. Selling for around $575, this package provides the minimum re-



Existing manifold has been removed, three-section Cummins turbo side-mount manifold has been installed. Now, adapter is ready for fastening to manifold center section.

quirements for a retrofit installation on a Cummins Type NH engine and is the only kit presently available.

Users report that kit installation is relatively simple and that the finished job will cost from $650 up. Depending upon the engine equipment being fitted out, the operator may need a new exhaust system, a new manifold, a new air cleaner. The 12 to 16 man hours required for the normal installation may run as high as $125, depending upon individual shop practices. All of this can run installed cost to $850.

What the kit has done has been to put turbochargers in the hands of tight-budget operators who need the long-term economies of turbocharged diesels but couldn't face up to big initial costs of new turbocharged equipment. Hence, the Jenkins kit provides the owner of older equipment with an opportunity to do some economy engine modernizing. When the job is finished, the operator has the satisfaction of knowing that his turbocharged rig—at least the turbocharger part of it—has the service backing of not only a leading turbocharger manufacturer, AiResearch, but is backed up by a rapidly expanding Jenkins service organization with 20 service stations already in operation in the 11 Western states.

According to Jenkins personnel, few of the kit customers are looking for more power.

"These fellows want economy," states sales manager Harry Riffel. "Though we are getting some play from the big operators, most of these are medium to small-size truckers. The fuel costs they save through turbocharging makes up a big part of their profits".

How much economy do Jenkins kit users say they're getting?

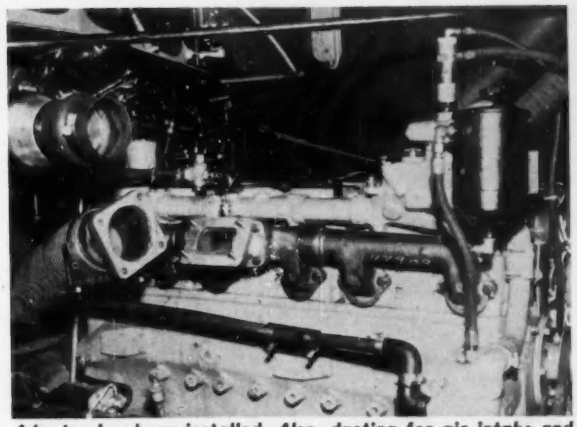
"Before turbocharging, our tankers used 75 to 78 gallons running from Los Angeles to Phoenix," reports one small fleet operator. "We made two trial kit installations and cut our fuel consumption to 64 gallons on the same run. That's about 20%."

Jenkins reports that a check of their customers indicates an average increase of one-half to three-quarter miles per gallon from a turbocharged diesel, *plus* a 25% to 30% increase in power. Those truckers who watch fueling extremely carefully frequently report an average increase of one mile per gallon and 5% to 10% increase in power.

In the Los Angeles metropolitan area air pollution control ranks as the second biggest sales point for turbochargers in general, and the Jenkins kit in particular. Innumerable tests by truckers and public groups have proven turbocharging to provide cleaner exhaust while increasing usable bhp.

"All our customers travelling into these big metropolitan areas are concerned over smoke emission," adds Riffel. "The operators feel they're protecting their profits by staying clear of fines resulting from heavy exhaust."

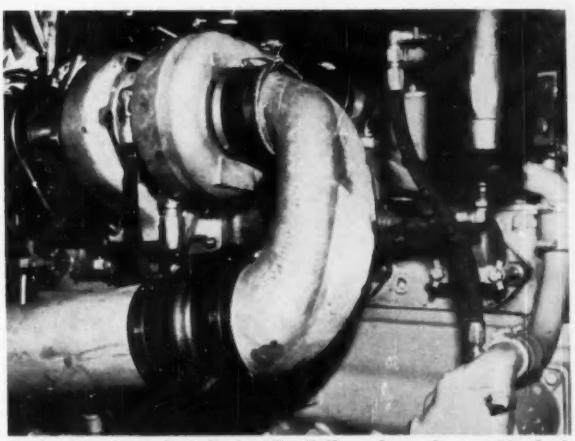
Though Jenkins can and does install their kit (they estimate they've made about 20% of the installations themselves), their sales pitch is that the kit is simple enough for any average maintenance mechanic to make the entire installation himself. They report few difficulties as a result of improper installation by average fleet mechanics. This is possible because of careful matching by AiResearch working closely with Jenkins. He uses only the T-1107 turbo, assigned specifically by AiResearch.



Adapter has been installed. Also, ducting for air intake and exhaust. Filter shown takes oil going into the turbo. Note that this engine is fitted with Kysor Shutterstat.

Much of the success of this kit venture must be attributed to Jenkins thoroughness in anticipating installation and, particularly, operating difficulties. They not only include a 25 micron bypass cartridge type filter as part of the kit, they discuss such peripheral, but all important, matters as crankcase ventilation and exhaust system design in detail in instruction sheets accompanying the kit.

Some of the engine additions and modifications that are anticipated include provision of a complete 5-in. exhaust system; an air cleaner such as a 14-in. Donaldson or Vortox with a 5½-in. outlet and with an air capacity perhaps double that of similar naturally-aspirated engines. Jenkins also recommends increasing crankcase ventilation by the addition of another rocker box cover breather, and instructs users to direct vent lines from the rocker box or crankcase breathers so they discharge well clear of air cleaners and inlet ducts.



Turbo has been installed. All oil lines have been attached, air intake and crossover ducting have been completed.

Mesabi Chief Mine overhauls shovel in the field, saving the time required to bring parts back to shop for cleaning. Trailer-mounted cleaner does the job on site.

High-Pressure Cleaning Pays Off

Field report shows trend to bigger portable units . . . increased use. These ideas will work for you.

Four stationary cleaners serve Mesabi Chief Mine shops.

Cleaning keeps equipment going and shortens down-time periods. This puts money in the till from two directions. Reducing labor time reduces labor costs proportionately, and equipment that gets back-to-work sooner produces more gross income.

But are you, the man in the field, taking full advantage of the cleaning equipment's capability? Since we're in the business of making power cleaners, we wanted to find out, and compare the cost-cutting effectiveness of the heavy-duty high-pressure type as compared to the steam-vapor type. Does the higher capacity cleaner justify its cost? To find out, we time-studied scores of operations.

What We Found . . .

We found that there are some shops that do not get the most out of their cleaner. This was apparent by comparison with others, who used the cleaner for every job we recommend plus a few we hadn't thought of. In these shops, where the cleaner is incorporated into the total maintenance picture, the heavy-duty cleaner is the most economical. Increased utility lowers per-job investment cost, and lowers the yearly shop man-hours by as much as one-third.

We also found a trend away from bringing the work in to where the cleaner is mounted. Trailer-mounted cleaners are going out into the field. This is especially true with contractors, whose equipment usually gets quite dirty and yet seldom gets into the shop for cleaning. Smart contractors are using the cleaner not only as such but as a maintenance tool.

Generally, we found many instances of good basic cleaning practice, with a few examples of genuine cost-cutting ingenuity. The feeling is that the more jobs a cleaner is used to do—and the oftener it does them—the lower the capital investment per job, and the

sooner it's paid off. Here are a few of the cleaning applications we saw. How many of these ideas can you use?

In The Shop . . .

To avoid corrosive damage from salt-encrusted snow, the City of Boston steam cleans all snow removal equipment as soon as it comes off the street. The Philadelphia Transit Co., which uses 6 heavy-duty Malsbary cleaners, finds steam cleaning a quick, effective way of removing winter's crud from city buses. A division maintenance superintendent says, "Our Schedule has been speeded up because we now do in hours what used to take days. We clean off ice and snow, as well as heavy greases, tars, grime and mud, with such ease and speed that everybody benefits".

Another contractor, working on the St. Lawrence Seaway in freezing weather, was hauling more frozen mud than payload. To prevent the build-up of frozen mud, he gave dump bodies a quick blast of high pressure hot water as they came off the fill.

If frozen mud build-up is a problem on your job, we suggest you try a trailer mounted cleaner. Tow it behind a pick-up, so you can thaw and flush mud from shovel buckets, truck bodies, scraper bowls, right in the field, thus carrying full payloads at all times.

Brown County, Wisconsin, has a trailer mounted Malsbary steam cleaner, which is used in winter for quick-thawing snow and ice from snow plows and trucks and from the underbodies of highway patrol cars. When spring thaws threaten to flood roads, the steam cleaner comes into service for thawing culverts.

But winter isn't the only time you benefit from steam cleaning. When a Mesabi Range miner found iron ore dust playing hob with track rollers, he tried steam cleaning. Said the maintenance superintendent, "Due to the fast action of our Malsbary heavy-duty cleaner, we find it practical to steam clean our crawlers after every 24 hours of service, just before greasing. We were getting only about 1200 hours on a set of rollers; now we get 2400 hours or more".

To facilitate track cleaning, Peterson Tractor Co., San Leandro, anchors crawler tractors to a concrete block, so located that the tracks can spin slowly on inverted railroad rails embedded in the concrete cleaning slab. This makes it easy to wash mud and dirt from track plates, links, and rollers.

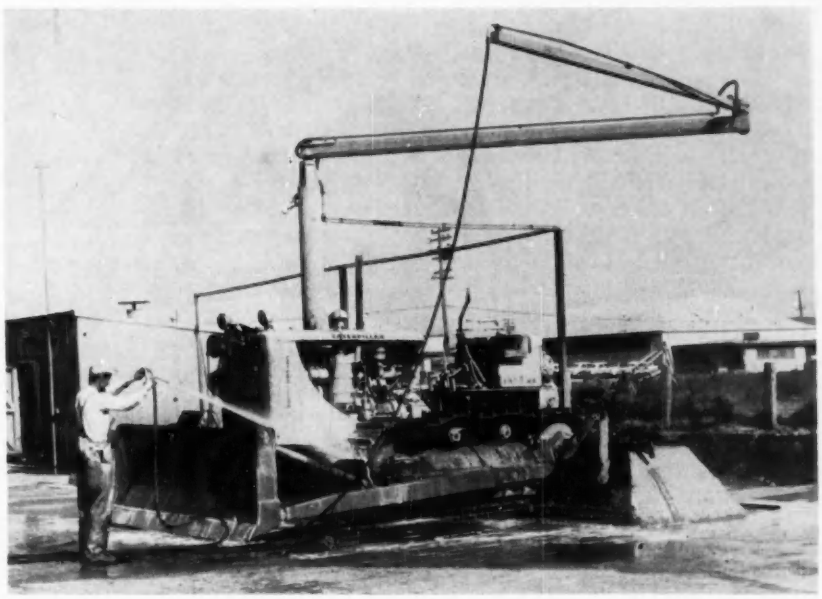
Doubling up Speeds Repair Work

The Kroger Company garage superintendent at Livonia, Mich., uses two Malsbary Model 250 HPC cleaners for servicing the 69 tractor units and 180 trailers which haul meat, frozen food and groceries on runs totaling 240,000 miles monthly. Both units frequently work at the same time—one on trailers, the other on tractors. He says, "Our Malsbary cleaners thoroughly clean the inside of a meat trailer in 10 minutes, using hot solution 200 psi or better. Our old method—straight steam and a hose, just smeared the animal fats in the trailer". Kroger also cleans each tractor under-carriage, fifth wheel, brakes, axles, at 2000 mile intervals, a 30 minute job for one cleaner.

In The Field

A contractor, who works mostly with asphalt, mounts his steam cleaner on his lube truck so he can clean graders and asphalt trucks right on the job. By cleaning grease off fittings and parts to be lubed, he speeds up greasing and keeps abrasive material out of working parts. Field cleaning also enables his roving mechanic to spot worn parts and cracks in time to prevent costly downtime.

An Ohio Turnpike contractor mounted his Malsbary cleaner and a 500 gallon water tank on a flat bed truck, so he could steam clean all rigs in the field before bringing them into shop for repairs. This enabled shop



Overhead boom in Peterson Tractor Company cleaning area permits operator to move around big rigs, keeping hose off ground. To clean track assemblies, rig is held by block as track spins on rails. As tracks spin, accumulated dirt is removed completely. A high-pressure unit reduces man-hours required to clean each vehicle, reducing cleaning costs.

Cleaning report . . .

(Continued from preceding page)

mechanics to go right to work on a clean machine. And, since the shop thus was kept free of job grime, there was less danger of dirt getting into vital parts when they were assembled.

Another booster for steam cleaning is the master mechanic for Mesabi Chief Mine, Keewatin, Minn., who says: "We have found that steam cleaning is the only way effectively to prepare our equipment for either repairs or a new paint job. Our 5 steam cleaners reduce cleaning time on our iron ore mine equipment by 75% and reduce total downtime as much as 40%.

"One of our cleaners is a special trailer-mounted unit. It carries two 150 gallon water tanks (sufficient for 1½ to 1¾ hours of cleaning at 200 psi) for use when not near regular water sources. It has both an engine and electric power, so it can be shop operated from usual power outlets or field operated with the engine.

"We used it when overhauling a 6½ yard shovel in the field. Because of steam cleaning right on the site, we reduced overhaul time to about 5 weeks from the 8 weeks necessary when we had to carry parts to stationary cleaners in repair shops."

Kroger Co. garage uses two cleaners side by side: one to clean tractors, the other trailers.

Summary . . .

Heavy-duty, high pressure cleaners were used in all of the cases cited above. This comment by Calvin W. Cannon, shop foreman for White Construction Co., Florida, explains why: "Getting equipment back into service quickly is vital, and our high pressure combination cleaner can give us an extra day. With it, we need only 3 hours to complete a job that our old steam jenny took 6 to do, and which would mean 12 hours of hand work".

Maintenance costs are one of the few areas where you can develop a competitive edge these days. We believe the fast cleaning possible with big cleaners is a sure way to reduce maintenance time and cost—and thereby assure yourself a competitive cushion.

Getting the right power team . . .

(Continued from page 19)

Now torque produced by the engine should be close to the same value. If the engine will not produce the required torque input, a bigger engine is indicated.

A Few Other Factors . . .

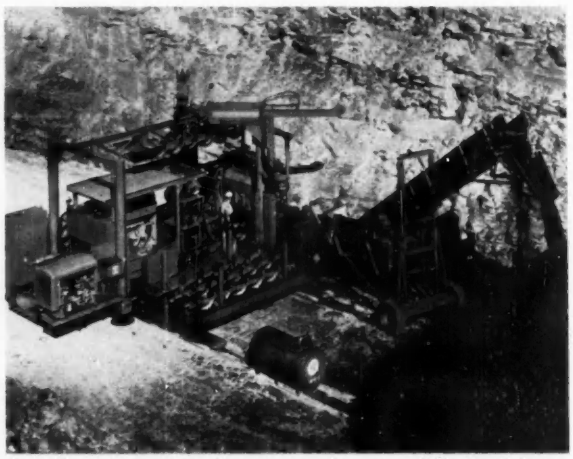
When calculating driveline component capacity, bear in mind that secondary drives can get pretty involved. The example we used was easy—a crusher with no power takeoffs. But in practice there are many complex requirements. What happens when you need four PTOs in mixed rotation driving through right angle drives and transfer cases? Obviously, you can end up with a pretty complicated hookup.

Also, each power takeoff is itself a piece of driven equipment. As such, it can be evaluated on charts similar to 1 and 2. If you have several takeoffs, it would be wise to call for some full-time engineering help. We are certainly willing to supply it.

Making It Fit . . .

Now that you've arrived at all the driveline components that you need, make sure that they will fit in the space available. A 2-speed gearbox is useless unless you have provision to shift the gears, and maybe some of the power takeoffs you require are not available in a standard unit.

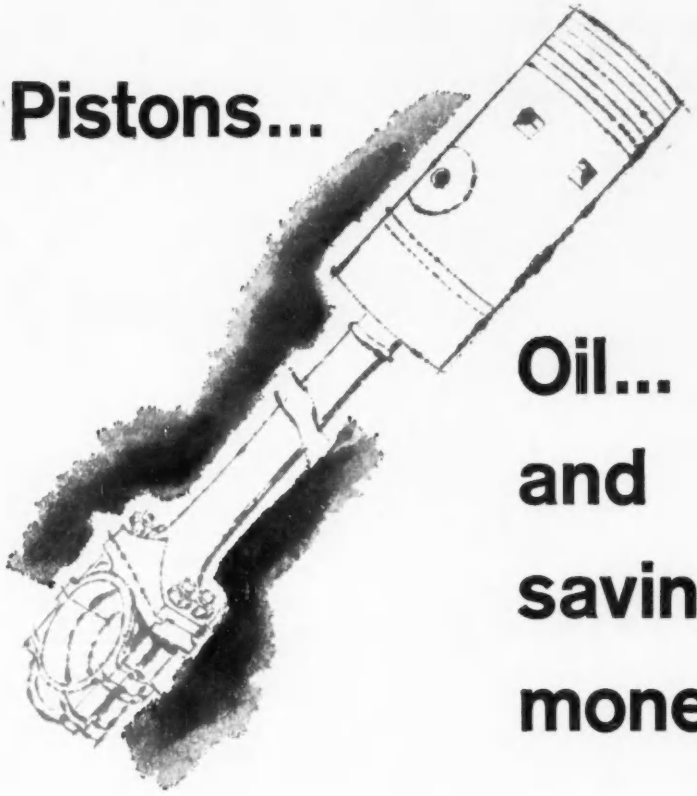
Before you're too quick to shy away from a "special", consider this: it may be cheaper. A standard transmission may not allow you to use the most economical engine. Or, a standard-component driveline drastically modified may be more expensive on the basis of initial cost.



Two Cummins-powered auger requires a multitude of transfer cases and reductions. "Specials" may be cheaper.

A wide variety of driveline components are readily available. Maybe standard units are all you need. Maybe you can modify standard components or perhaps a specially-designed one is the best answer. But don't make an unnecessary compromise. Chances are, it'll come home to haunt you later when you start adding up the bills.

Pistons...



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Four Enterprise Model TDSQ 318 Tri-Fuel Engines at the Bowery Bay Pollution Control Project, Astoria, New York, are saving the cost of three quarters of the fuel required for treating sewage. Each is an eight-cylinder supercharged Enterprise Engine rated 1755 HP at 360 RPM and would normally consume 2,000 gallons of fuel per day; but by utilizing the free sewage gas (methane), produced by sludge digestion, requires an average of only 500 gallons in dual fuel operation.

The versatile Tri-Fuel Enterprise Engines perform triple services in the Bowery Bay Plant, supplying (a) power to pump 100 million gallons of sewage per day; (b) power for four 1,000 HP induction motors that drive four 25,000 CFM air compressors; (c) heat to maintain a 90 degree temperature in the sludge heating systems, and comfortable heating for the buildings.

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Safety Control-Mechanically!

A safety control kit that operates without any external power source has been developed using Amot Controls Corp's basic 2800 safety control as the tripping device. The 2800 kit fits all General Motors Series 71 engines. This control is a welcome accessory for normal service, and something of this type is mandatory for protection of expensive engine equipment in unattended service. A slight malfunction not caught in time could end in destruction of the engine. Since Amot's unit is entirely mechanical, it can be mounted on normally difficult applications.

The safety control will shut down the engine in event of overheating of jacket water, failure of lubricating oil pressure, and on overspeed. Other safety control features can be introduced into the system to meet individual requirements, all of which operate mechanically. The kit is furnished complete with everything needed, including all fittings and tubing.

How It Works . . .

Control is through the lever attached to the arm of the air flapper valve found on all GM Series 71 engines, except marine models. When the safety control trips, the air flapper valve closes. Lack of air shuts the engine down. The original emergency hand-controlled shut-down cable is re-attached at the Amot unit for manual shutdown when needed or desired. Picture at top shows this hookup.

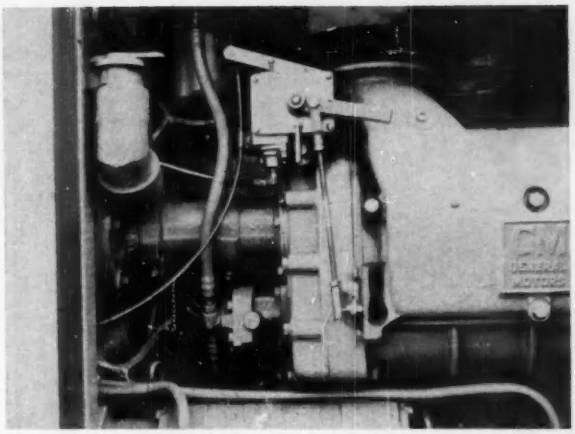
All of the shutdown actuating mechanisms are held activated by lube oil pressure. If engine overheats or overspeeds, lube oil pressure to the control is dumped, causing shutdown.

For over-temperature shutdown the temperature valve senses jacket water temperature. Lubricating oil pressure is supplied to this valve, with one line going to the safety control and another acting as return line to engine sump. The line from the temperature valve goes first to the overspeed valve, and then to the safety control pressure bonnet. On overspeed, the overspeed-valve will open and dump the oil pressure, thus tripping the safety control. This hookup is shown in the pictures, too.

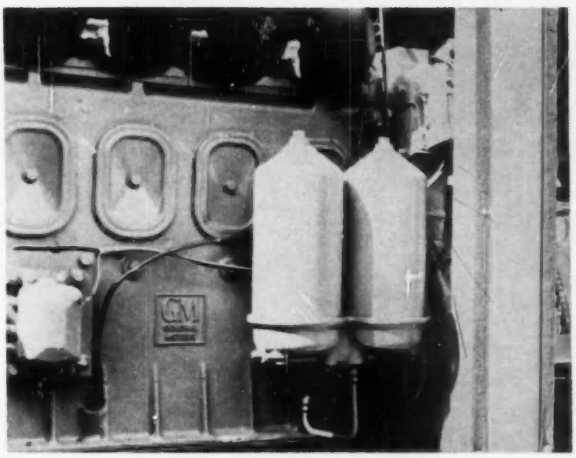
Safety control is adjustable to trip from oil pressures of 5- to 45-psi, but normally is set for 10-psi. Temperature valve is usually supplied set at 200°F and is non-adjustable. However, valves can be supplied for any temperature. Overspeed valve, when used, is adjusted on and for the job.

Two kits are available. An A-kit includes the overspeed valve, while the B-kit omits it.

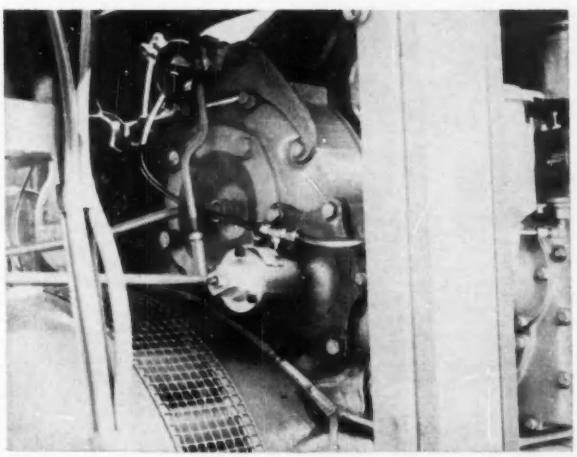
Adaptations are already being made for installation on other engines. Worthington, for example, is adapting the 2800A safety control kits for use on the Mercedes-Benz engines they are using to power refrigerators in service with Pacific Fruit Express. In this kind of unattended service a safety shutdown is a must. For similar Series 71 installations, the kits will be a welcome addition to installations with similar requirements, and can be fitted easily in the field.



On GM 6-71, when control trips air flapper valve closes, shutting off air. Emergency hand control is attached.

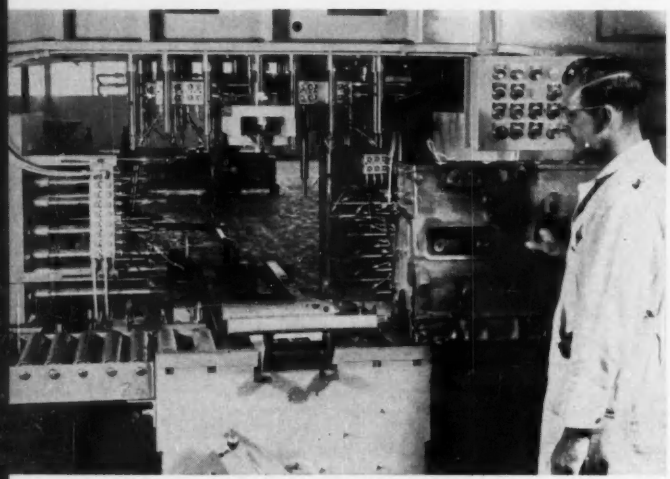


Amot model 2230 temp valve installed (above filters). Lube oil pressure goes to valve, with return to sump.

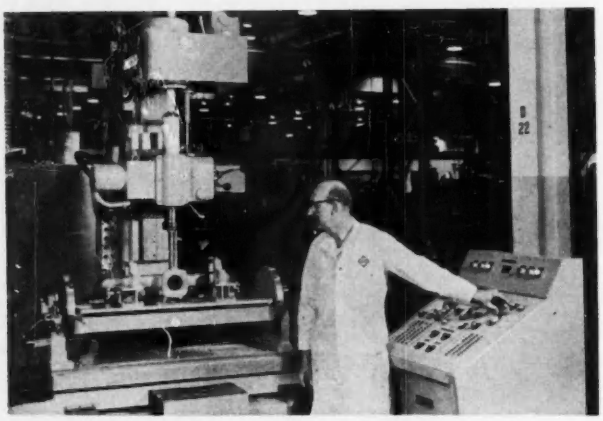


Model 2189 overspeed valve with lube oil lines. On overspeed, valve opens to dump oil pressure, tripping control.

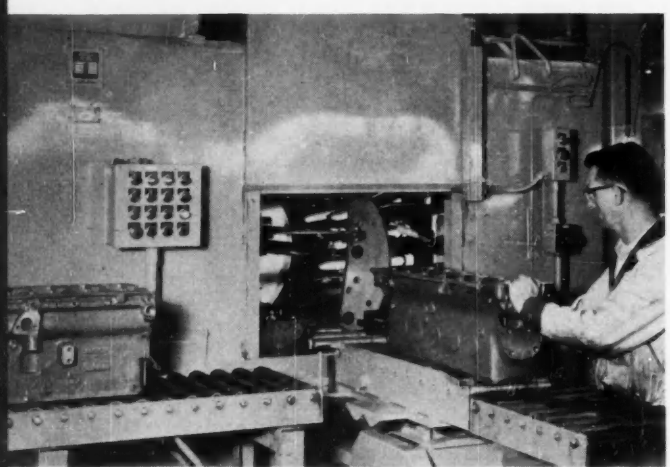
A-C's Automated Engine Plant



Norgren spray heads clean and lubricate taps used in multi-spindle machine to tap all holes in ends and face of block.



Numerically-controlled drilling machine which drills, reams and taps engine manifolds in Allis-Chalmers engine line.



Centri-Spray cleaning machine positioned at end of each engine block machining line washes with alkaline-base solution.

Production of Allis-Chalmers engines has started in a new 515,000-sq. ft. engine manufacturing facility recently completed at the Company's Harvey, Ill. Works. Erected on 35 acres the Company owns in the Village of Phoenix, the new 440 x 1100-sq ft steel and concrete structure houses some of the most modern production equipment available to the engine manufacturing industry.

This equipment, together with the latest production techniques, combine with the modern facilities to provide an automotive-type straight-line production system under which material is fed into the line at one end of the building to emerge as a completely assembled engine at the other end, ready for final test prior to shipment.

The new plant has four semi-automatic assembly lines which are capable of producing more than 130 different variations of 4- and 6-cyl diesel, gasoline, butane and gas engines. A fifth line is manually controlled and from it flow engine driven electric sets, power units, marine engines, and special industrial engines.

Engines currently produced by the new plant are in the 41- to 350-hp ranges. Owen J. Higgins, General Manager of the Harvey Works, points out, however, that Harvey's new engine facility has been designed, built and equipped in such a manner that expansion to larger horsepower engines can be carried out in a relatively short time when the need arises.

More than 600 machine tools have been installed in the new plant, including over 200 completely new units. Machine tools moved from the former engine plant are generally not more than two or three years old. Each was steam cleaned, painted and otherwise renovated before being installed in its new location.

One of the many features of the new plant, in line with the extensive quality control program in effect at Allis-Chalmers, is the area for testing engines as they come off the assembly line. Diesel engines are checked in 34 test areas each with its own electronic equipment designed by company engineers in cooperation with the manufacturer of the equipment. These test consoles are complete with gauges, meters and other instruments, which, among other things, give readings on actual fuel consumption and brake horsepower output. This assures that each diesel engine shipped is in accordance with its rated specifications.

A mobile calibrating cart is used to check the accuracy of each console. It is capable of simulating all temperatures, pressures, speeds, fuel weights and perform other functions necessary to test and calibrate the instrument panels of each console.

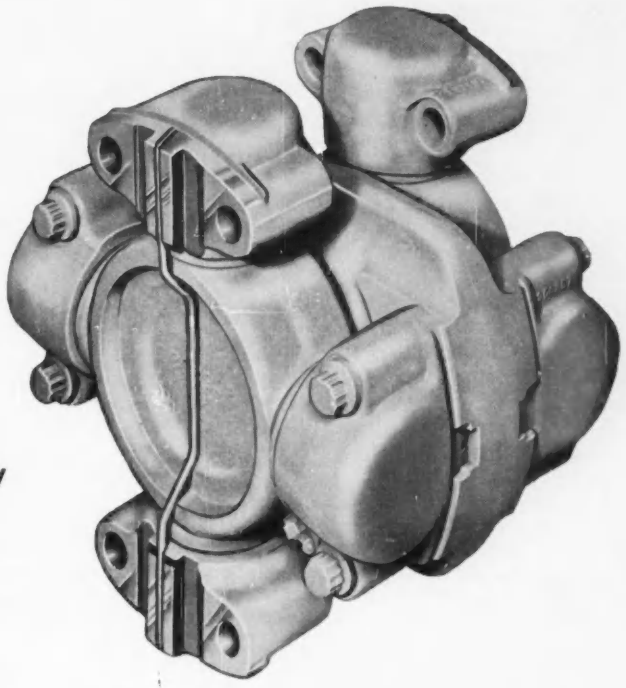
Tape Controls The Units . . .

Included among the many new production tools are tape controlled units installed to meet many of the special problems unique to the commercial engine production field. With many variations within each

(Continued on page 30)

Product Report:

Twin Disc GWB U-Joint Line



Model J series features 24 heavy-duty combinations with differing length propeller shafts, with or without slip.

Twin-Disc announced their "Engine-to-Axle" program a little over a year ago with introduction of their power shift transmissions and a vehicular-type torque converter. They also announced a license agreement with GWB, one of the largest and best known manufacturers of U-joints in Europe. Twin-Disc is now manufacturing these U-joints for the American market.

Known as the Model J series, there are 24 products: four sizes with six different types in each. Types vary according to length, and as to whether or not slip is provided in the shaft. Yoke-type installation is standard on all sizes. Capacities range from 4250-lb/ft to 12,700-lb/ft rated static torque. Static torque is defined as 45% of static yield torque, the loading that is destructive.

The Twin-Disc-GWB model J series U-joints all use a type bearing design called "high wing," which roughly resembles a bearing cap. This construction provides long externally-wrenched bolts for attaching the bearings. Primary advantage is that it permits use of a larger bearing without appreciably increasing the overall size of the joint, or increasing its swing diameter.

Another advantage is a serviceable assembly that is lighter per unit of strength, since there is no need for companion flanges. From a design standpoint, the center line of the bearing is close to the center line of the joint in both driven and driving ends. Thus, overhanging loads are reduced.

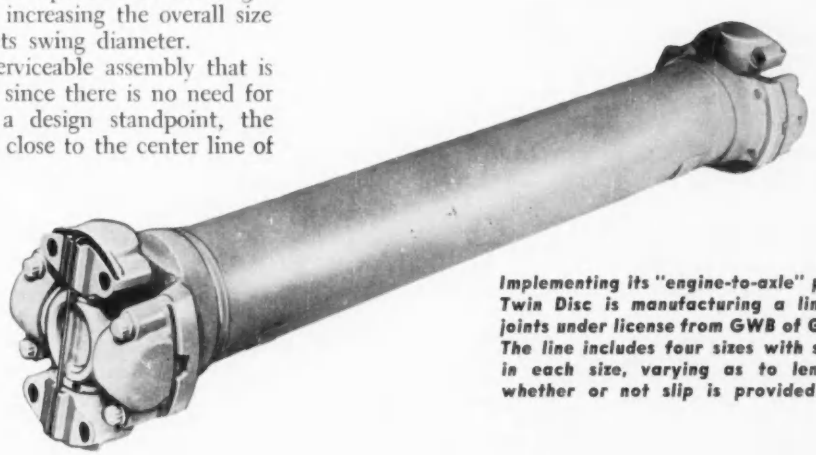
Design Features . . .

The entire model J series uses caged needle bearings. Since the cage holds each needle parallel to its axis of rotation, there is no skewing effect. Each needle takes a full even load, and the cage provides the additional advantage of holding grease.

Needles are slightly tapered at the ends. Relieved ends eliminate stress concentrations in this area, spreading the load evenly over the entire bearing surface. This reduces spot loadings which lead to needle bearing deterioration.

In the trunnions, shoulders are tapered at the bases, reducing bending stresses. This construction also provides a larger diameter sealing surface and reduces like-

(please turn page)



Implementing its "engine-to-axle" program, Twin Disc is manufacturing a line of U-joints under license from GWB of Germany. The line includes four sizes with six types in each size, varying as to length and whether or not slip is provided.

Allis-Chalmers Plant . . .

(Continued from page 28)

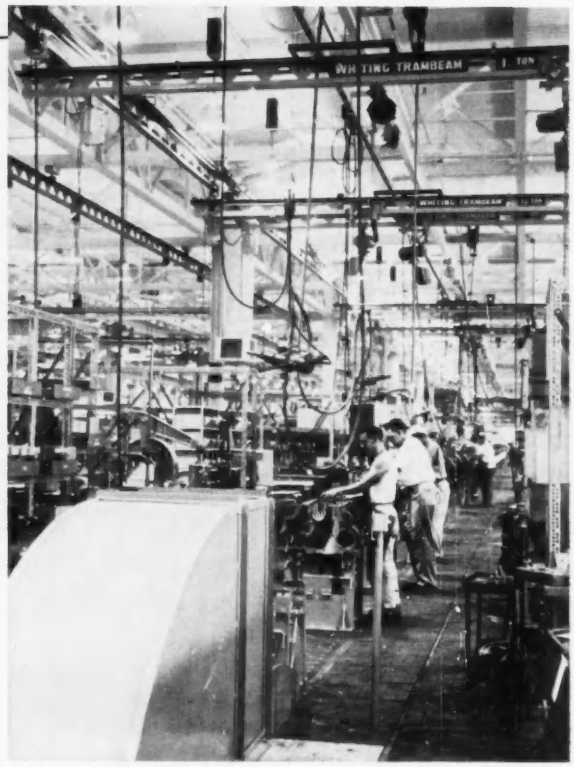
production process, an individual tape controls the operations of the machine to its job on each part. Fly wheels, for example, differ from engine to engine. One tape controls machine operations—placement of holes, tapping and so on—for each model.

Adjoining the main 11-acre engine plant is a separate building in which are housed all power and plant service facilities. Fuels and lubricants are piped to points of use in the plant and test area from underground storage located near the service building.

Engines produced at the Harvey Works are used primarily in the many Allis-Chalmers products, and in a line of lift trucks also produced at the Harvey Works. In addition, Allis-Chalmers engines are an important source of power supply for the commercial engine markets, including the construction and logging industries, oil fields, for irrigation, the marine trade, and industries requiring stationary and portable electric sets.

Summary . . .

Modern production techniques provide Allis-Chalmers with the advantages of a straight-line production operation within a framework geared for a multitude of differing product. Usually, the wider the range of product difference the higher the cost penalty. But with its new facility, Allis-Chalmers is in a far more favorable competitive position.



Start of one of four automated assembly lines in operation.

Twin Disc . . .

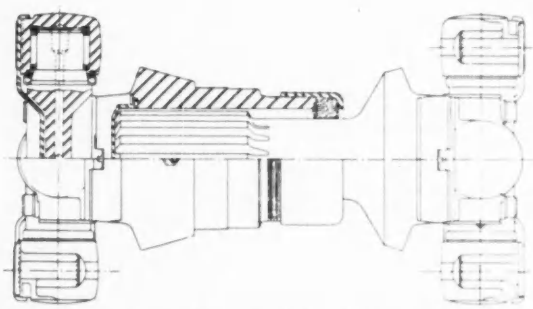
(Continued from preceding page)

lihood of seal damage during assembly. Seal is double-lip labyrinth for positive protection against grease leakage and for effective purging of used grease and air.

At the ends of the trunnions, specially-designed nylon thrust bearings prevent metal-to-metal contact. This minimizes friction and prevents galling under heavy loads, and nylon bearings are self-adjusting to compensate for minor deflections.

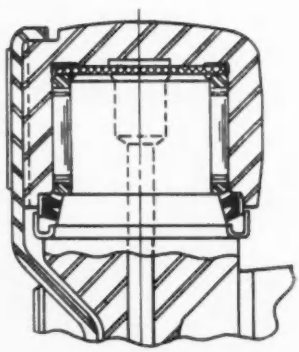
Summary . . .

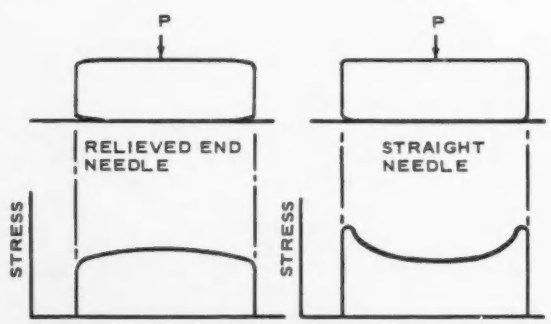
With this new line in production, Twin-Disc can now provide "engine-to-axle" components of their own manufacture. Fully warranted, they are backed up by their nationwide parts and service organization. They are available as replacement assemblies or for new applications. Technical assistance is available for any proposed application.



Typical example of what's available is the type "CS", consisting of close-coupled U-joints connected by a spline.

Tapered-shoulder trunnions reduce bending stresses, also provides a larger-diameter surface for effective seal.





Relieved-end needles are slightly tapered to eliminate stresses, adding appreciably to the life of the bearing.

ACCURATE CONTROL for Small Engines MODEL LE GOVERNOR

World's Smallest ISOCHRONOUS GOVERNOR

AD NO. 32-31

Now available — world's smallest hydraulic isochronous governor — the Curtiss-Wright Marquette Model LE. This is not only the world's smallest but also the world's finest governing device for diesel, gasoline or gas engines. Measurements of the basic governor are 2″ square by 4″ high, with a total weight of 1½ lbs. Various base adaptations are available which permit application of the governor to engines requiring up to 18.6 lb.-in. torque for operation of the fuel control system.

Design and production engineering plus high standards of manufacturing and quality control provide accurate governor reliability and long life operation.

A load and frequency sensing accessory may be incorporated with the governor to obtain precise control of frequencies. Externally adjusted droop is available for parallel operation of units, and an electric motor for remote speed settings.

There is a Curtiss-Wright Marquette Governor that will exactly meet your requirements. Write for descriptive literature on this and other models in the Curtiss-Wright Governor line.

MARQUETTE DIVISION
CURTISS-WRIGHT CORPORATION
1145 GALEWOOD DRIVE, CLEVELAND 10, OHIO
Distributed in Canada by Canadian Curtiss-Wright Ltd., Toronto & Montreal, Canada

For information write in No. 1110

Roller Cam Action of Over-Center Clutches
Reduces Wear, Pressure and Adjustments

Rockford exclusive anti-friction roller cams increase clutch life, lower pressure needed to engage and release, and reduce clutch adjustments. Precision-ground, hardened steel rollers force pressure plate against facing and flywheel for smooth, powerful engagements. Actuation progresses from "release" to "on-center" to the slightly "over-center" locked position. Operated by hand lever, Rockford Over-Center Clutches remain in or out of engagement until changed by the operator. Clutches fit flat or counterbored flywheels. Oil or dry operation. Torque loads from 365 to 3,000 lb. ft. Write today for illustrated brochure.

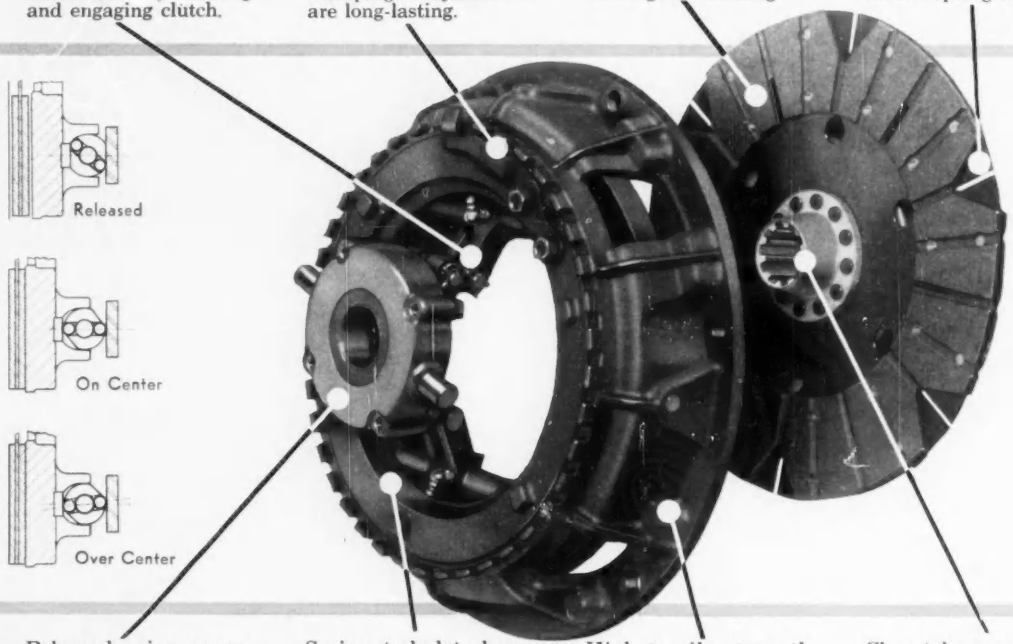
Allis-Chalmers Crawler equipped with Rockford Over-Center Clutch

Patented anti-friction roller cams reduce wear, adjustments, and lever pressure. Slight pressure to rollers forces pressure plate and facing against flywheel, instantaneously locking and engaging clutch.

Positive-lock adjusting ring allows fine adjustments for longer life and smoother starts. Simply release lock and turn to exact engaging position. Positive-lock prevents "creeping". Adjustments are long-lasting.

High-test facings give extra-long clutch life, reduce scoring, and greatly cut costs of downtime, replacement and labor. Strong, lightweight construction permits easy shifting and braking.

Segmental slots prevent "dishing" . . . even under extreme heat conditions. Rotary surface grinding assures perfect, uniform flatness. Core plate is made of special high-carbon spring steel.



Release bearing assembly consists of bronze or ball bearings. Clutch is actuated from hand lever to yoke contact on trunnions. Pivot pins give direct, smooth actuation between release sleeve and cam arms.

Spring steel plate, bearing against roller cams, yields slightly upon actuation. This assures extremely smooth engagements, relieves cover plate of strains, maintains uniform pressure, and gives longer life.

High tensile strength cover plate assures safe operation. Compact, low-inertia design prevents gear clashing and delayed shifting. Dynamic and static balancing of each clutch eliminates vibration.

Close-tolerance splined hub assures perfect disc alignment. Through-hardened hub gives long life. Bolt circle and pilot dia. accurately locate cover plates. Precision manufacturing eliminates misalignment.

ROCKFORD CLUTCH

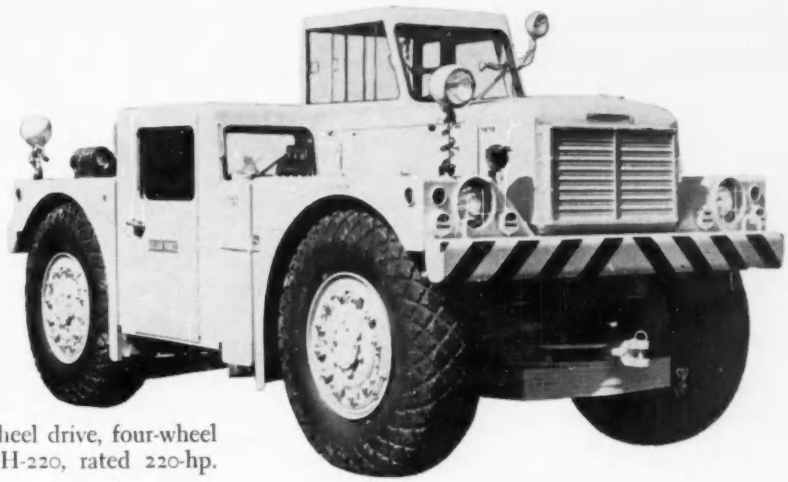
1212 WINDSOR ROAD, ROCKFORD, ILLINOIS

Export Sales Borg-Warner International • 36 So. Wabash, Chicago, Ill.

ROCKFORD B-W CLUTCH DIVISION OF BORG-WARNER

For information write in No. 1111

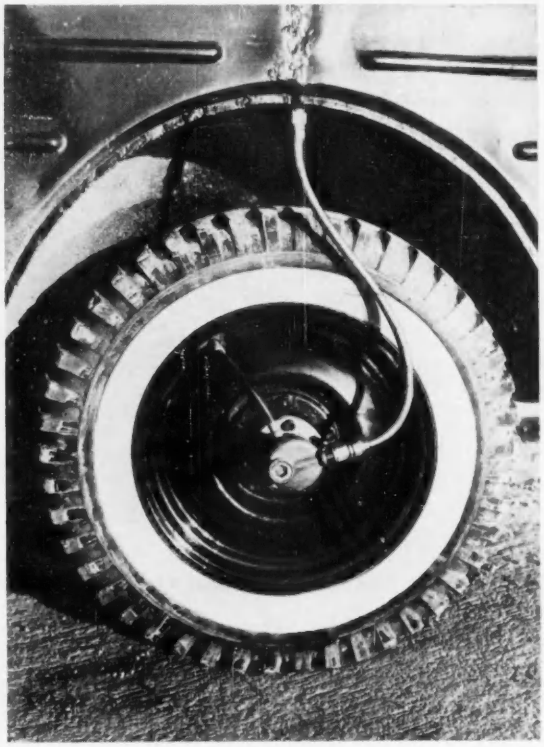
NEW DIESEL POWERED EQUIPMENT



Aircraft Tow
Consolidated Diesel Electric Corp. model 2131 tow tractor can handle aircraft up to 500,000-lb. Separate heated cab is provided for ground service personnel, in addition to driver's compartment. Vehicle has four-wheel drive, four-wheel steering. Engine is Cummins NH-220, rated 220-hp.

With Power-Shift
LeTourneau-Westinghouse's B Tournapull now has an optional all-new "Powerflow" transmission. It is a constant-mesh counter-shaft type unit with full power shift and torque converter. Standard equipment includes lock-up clutch and oil retarder. If desired, Fuller L-1550 step-gear type transmission with two ranges is available. Engine is GM 12V-71 diesel rated at 430 horsepower.

Filtered air for Electric Wheels
Huge off-highway rig with four-wheel electric drive uses two American Air Filter type D Roto-Clone filters, one for front wheels and the other for rear, as dust collectors. They serve as air cleaners for the air that ventilates the four electric wheels.



Air System Varies Tire Pressure

Pneumatic tires can now be inflated, deflated, and continuously gauged while the vehicle is in motion. The control has been developed by A. Schrader's Son (Schrader) for use on fleet and off-highway equipment. It provides running inflation for rapid correction of tire pressures, correcting as necessary for road surface, vehicle load and speed. System is under driver control, is very useful when vehicles have to traverse mud. In many cases it keeps them from bogging down.

Tach Records RPM and MPH

A new tachometer is being marketed by Argo Instruments Corp. This recording instrument indicates both engine speed and road speed, and records the data on both sides of a single chart. At one glance, the chart can reveal dangerous or costly driving practices. The TCO 14-2 model shown provides a continuous, closed and tamper-proof record, guarding against lugging and over-revving.

840-hp Tractor on Rubber

Series K-103 R. G. LeTourneau tractor is intended to supplant tandem-pushers for loading big-capacity scrapers. This one, designated "Pacemaker", helps a 36-yard scraper load dirt at 1-ton/sec. Power for the brute is two diesel-electric generator sets supplying power to 3 electric wheels.

WHY
THE "PROS"
PREFER
PERFECT CIRCLE
PISTON
RINGS...
AS ORIGINAL FACTORY EQUIPMENT IN 94 BRANDS OF VEHICLES AND ENGINES. AND, MORE AWARD-WINNING FLEETS USE PC RINGS THAN THE NEXT FIVE BRANDS COMBINED

NEW TRI-COIL OFFSET SPRING

INCREASES DRAINAGE, CUTS CLOGGING

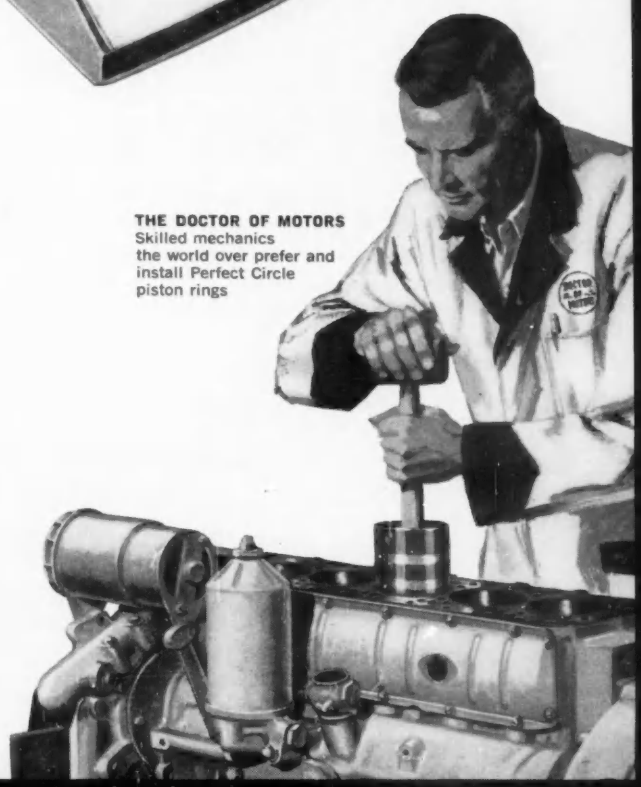
The new special alloy steel spring in Perfect Circle's chrome OS89 heavy-duty oil ring is offset in a channel next to the drainage slots, instead of being directly behind them.

As a result, drainage is completely unobstructed by the spring, and clogging is reduced to a minimum.

And, this amazing new spring is made of 3 interwound coils. The unique design makes possible great strength and durability in a smaller diameter. There's also a greater area of contact with the ring all the way around for more uniform pressure, greater conformability and less friction.

Only Perfect Circle has this new type of ring that reduces clogging for better oil control in heavy-duty engines.

For an informative booklet on the new OS89, contact your PC supplier or write to Perfect Circle, Hagerstown, Indiana.



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Skilled mechanics the world over prefer and install Perfect Circle piston rings

PERFECT CIRCLE

PISTON RINGS • POWER SERVICE PRODUCTS
HAGERSTOWN, INDIANA · DON MILLS, ONTARIO, CANADA

For information write in No. 1112

All Metal Flex Connector

Universal Metal Hose Co. is offering an all-metal bronze and carbon steel flexible connector, the UG3, for moving gases and liquids at temperatures up to 750°F. Stainless steel versions are suitable for temperatures of 850° and 1400°F. Features a braided metal outer cover and a corrugated inner tube for combined flexibility and high strength. Absorbs misalignment, expansion and vibration without protest.

1153

STEEL **USE BELL** STAINLESS
INJECTOR CUPS
FOR THE LEADING TRUCK DIESELS
Years of proven service
Volume production on automatic machines means SAVINGS
We pass this on to the consumer
Sold by all parts houses
BELL DIESEL RESEARCH
Pioneers in research and manufacture of high speed diesel injection equipment.
P.O. Box 842, Glendale 5, Calif.
Telephone: Citrus 1-4721

For information write in No. 1113

Mechanic's Stethoscope

Borroughs Tool & Equipment Corp. has a low-cost stethoscope on the market. A helpful tool that helps the mechanic pinpoint the exact source of that noise that's hard to find. 1154

High-Capacity Torque Wrench

P. A. Sturtevant Co. announces a new high-capacity torque wrench that allows direct readings up to 600 ft-lb. Torque applied by operator is multiplied five times, meaning that the old extra length of pipe is no longer needed. A sensory signaling device signals operator when pre-set torque is reached. Also includes a visual scale. It's called model S600. 1155

REPRESENTATIVES WANTED
MUST CALL ON FLEET, BUS, CONTRACTORS AND DIESEL ENGINE REBUILDERS.
CLEVELAND HONE & MFG. CO.
DEPT. 10
8816 HARKNESS RD.
CLEVELAND 6, OHIO

For information write in No. 1125

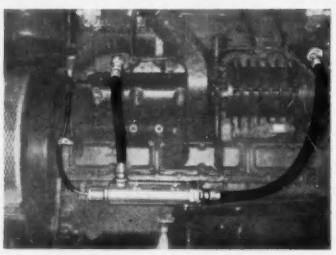
Plastic End-Cap Protectors

A new line of general purpose plastic protectors is available from Alisco. Low-cost products applied in or around ends of parts protect them during storage or handling. Especially useful if threads are involved. 1158

DIESEL ENGINE PARTS
Specializing in GMC: 278A, 567A, B & C, 268A
Fairbanks Morse, Enterprise, Nordberg, Baldwin
A. G. SCHOONMAKER COMPANY, INC.
Service Parts Division
Est. 1898
Dept. I Foot of Spring St., Sausalito, California
Phone: EDgewater 2-1490
WRITE WIRE PHONE

For information write in No. 1126

KIM HOTSTART Diesel and Gasoline Engine Pre-Heater



CUTS COSTLY COLD WEATHER DELAYS

KIM HOTSTART assures instant starts . . . instant peak performance in below-zero weather when commercial power fails. KIM plugs into electric circuit, draws cold water from engine, heats and circulates coolant through engine.

Easy to install . . . inexpensive to operate, Kim Hotstart quickly pays for itself because it prevents cold weather damage, reduces wear and costly down-time.

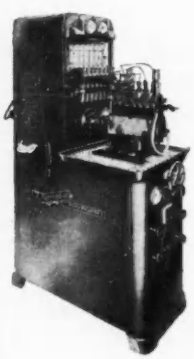
Install the Kim Hotstart on your liquid cooled diesel and gasoline engines. Approved and used by all major engine manufacturers.

For additional information, see your dealer or write direct to Kim Hotstart.

KIM HOTSTART
West 917 Broadway
Spokane 1, Washington

For information write in No. 1114

NEW HARTRIDGE POWERMASTER "8" CAN HANDLE 99% OF YOUR DIESEL FUEL PUMP TEST REQUIREMENTS



If you're looking for one *all-purpose* test bench, the Powermaster "8" is it! Designed to fill the gap between the Hartridge medium-sized and heavy-duty models, Powermaster "8" is powered by a 5 h.p. motor to handle all types of Diesel fuel pumps up to 8-cylinder capacity.

Powermaster "8" incorporates all advanced features of other Hartridge test benches, including electronic and pressure phasing which saves 40 minutes service time against ordinary spill timing. In addition, it will record automatically up to 1,000 strokes without manual re-setting.

Since Powermaster "8" will handle 99% of the heavier testing jobs, it also makes an ideal *second* unit. Most accessories from the Hartridge medium-sized "Major" test bench are interchangeable with it. Contact DIESEL INJECTION today for complete details.

DISTRIBUTED EXCLUSIVELY IN THE U. S. BY

Diesel Injection
SALES & SERVICE, INC.

1120 E. Brambleton Ave.
NORFOLK, VIRGINIA
Phone MAdison 2-5691

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November, 1961
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Are you responsible for the mechanical performance or maintenance of your company's mechanical equipment? ☐ Yes. ☐ No.

Do you have a voice in the selection of this equipment? ☐ Yes. ☐ No.

Please check any or all boxes if they apply.

My company operates:
☐ Construction Equipment.
☐ Off highway trucks.
☐ On highway trucks; buses.
☐ Industrial or stationary engines and equipment.

1 Simply note the numbers under advertisements and editorial items which interest you.

2 Then, write the numbers in the boxes on the card.

3 Fill in your name and address. Check off your job function.

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DIESEL EQUIPMENT SUPERINTENDENT

Start your subscription Today!

Two New Items from Kendall

Kendall Refining Company has made two new items available. The first is a penetrant that breaks through rust and corrosion, and leaves a preservative film to protect against recurrence of the seizure. It also removes moisture from electrical components. Second product is a low-cost petroleum-base undercoating for protecting the underside of passenger cars and trucks. Can be used on both new and older vehicles, without special preparation or masking.

1159

Air Control Device for Spring-Actuated Parking Brake

Williams Power Brake Equipment Co. has announced an air control device for spring-actuated parking brakes. This WM-325 controls air pressure between tank supply and spring brake units. A check valve keeps high governor setting air pressure against the springs at all times. Manual application is possible any time; automatic application takes place between 35- to 40-psi tank pressure.

1160

Hubodometer for Truck and Bus

Engler Company's hubodometer has a raised bracket design that allows the instrument to be used on all known truck and bus wheels, front and rear, regardless of axle protection. Legible digits record mileage calculated automatically off wheel revolutions. Tamper-proof recorder provides an accurate record of miles covered, good info on which to base PM.

1161

Tire Sealant Makes Tubeless Tire Desirable

Safeguard Tire Sealant, on the basis of application in tubeless tires on the Willig Freight Line fleet, is claimed to provide self-sealing protection to tubeless tires. Tubeless tires have certain advantages, but also have the problem of chronic leaking in some cases. According to Safeguard, they've licked this problem, leaving only the advantages. And, they're talking about heavy-duty tire service. They'll tell you all about it, if you ask.

1162

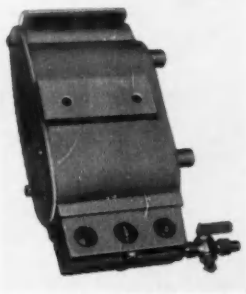
Forget Winter Starting Worries with ZERO START

• Engine Preheaters • Starting Fluid Injectors

Starting "right off" on the first turn — even in subzero temperature — is mighty important in meeting winter schedules. Lost equipment-and-man-hours can never be made up . . . not to mention the wear and maintenance problems which cut into cold-weather profit. This winter, put your equipment to work full time with the help of low cost *Zero Start* starting aids. Start 'em sure, fast and easy — any day of the year — and save money doing it. No more engine warm-up time, towing expense, equipment damage, dead batteries or frayed tempers when the mercury dives. There are a variety of quality-engineered, ruggedly built Zero Start preheaters to fit your operation and put an end to winter starting worries.

A full line of starting aids for all types of equipment...

Diesel Starting Fluid Injectors —starting fluid released into manifold by simply pressing a dashboard-mounted button. When engine reaches operating temperature, automatic shutoff prevents further use—and misuse—of unit. Uses replaceable, standard aerosol can. For diesel and gas engines.



Propane Gas Block Heaters— Operates on propane gas. Will burn all night (or longer if necessary). Keeps warmed coolant circulating throughout the engine. Summer-like starts even in the coldest weather. Easy to operate—durable . . . for any liquid cooled engine.

External Tank-Type Preheaters —Just plug into an electric power source. Coolant is warmed and circulated throughout the entire engine for instant starts. 450 — 500 — 850 — 1000 — 1500 — 2000 watts. With or without thermostat. For liquid cooled engines. Head Bolt Heaters also available to fit most models.

For complete information — write

PHILLIPS MANUFACTURING CO.

8228 Grand Avenue South • Minneapolis 20, Minnesota

For information write in No. 1116

NEW LITERATURE

Maintenance Guide

Gulf Oil Corporation has made available a trouble-free maintenance guide for commercial vehicles and other automotive equipment users. Features a maintenance section directed toward cutting your replacement parts costs and your operating costs in general. This is a complete 76-page book that runs through everything from vacuum boosters to tires, and includes a lot of helpful ideas for any equipment operator. There's no charge for the book, but requests *must be made on company letterheads.*

1163

Diesel Catalog Full of Facts

If you have to write specifications—or if you're responsible for a phase of diesel engine maintenance—Briggs Filtration is offering a catalog to guide you. It covers just about every type diesel installation you'll find, and is full of good basic information that's needed from day-to-day. No charge, use the readers service card. **1164**

Tach System Catalog

The Herman H. Sticht Co., Inc. announces a new line of electrical tachometers and a catalog describing a complete tachometer system including tachometer generators (transmitter), the tach indicator (receiver) and various types of drives to connect these tachometer generators to industrial machinery, motors, engines and other rotating equipment. Bulletin 720 also shows enclosures for wall mounting the indicators, including waterproof models that protect against adverse ambient conditions.

1165

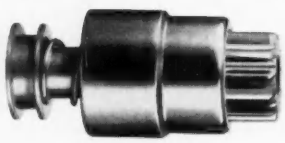
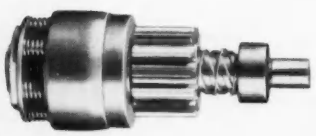
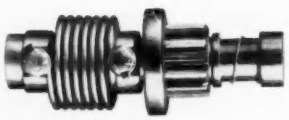
Vibration Control

Lord Manufacturing Co has just issued a 16-page brochure describing products and facilities available to users. Brochure is entitled "Lord Vibration/Shock/Noise Control", which is self-explanatory. Lord is one of the foremost authorities in this field of vibration control, and booklet is worth having as a reference.

1166

Test Kit Instruction Manual

Kiene Diesel Accessories have just made available a very comprehensive test kit instruction manual on their AC-500 test kit. Manual outlines test procedures on multi-plunger pumps, such as American Bosch APE pumps, and for the PSB type, both early and later versions. Also for Roosa Master. It outlines a whole range of tests including pump and its timing to the engine, as well as checks on the supply pump and nozzles. There is also a special section on trouble-shooting, which is one of the things the kit does well. If you're going to fix something, it

REGARDLESS OF  DIESEL SIZE, THERE'S A  BENDIX  STARTER DRIVE TO FIT THE NEED !!!

Diesel engineers know the importance of quality-built starter drives to engine performance. Significantly, many of them specify Bendix® Starter Drives. Bendix has nearly 50 years' experience in starter drives . . . produces a complete line to fit any type or size diesel. Precision-made to deliver top performance, economy, and sure starts, these drives can be mounted easily, in more positions, for greater flexibility. Simple designs mean fewer parts to wear or adjust. Good reasons why Bendix Starter Drives are standard equipment on more diesel engines than any other make. Eclipse Machine Division, The Bendix Corporation, Elmira, New York.

Export Sales and Service: Bendix International, 205 E. 42nd St., New York 17, N. Y.

Bendix-Elmira

THE Bendix CORPORATION

For information write in No. 1117

UNDERSPEED . . . One S.P.D.T. switch to trip at speeds as low as 250 RPM. Maximum operating speed 5,000 RPM.

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OVER AND UNDERSPEED . . . Two S.P.D.T. switches to trip at two different speeds between 300 and 6,000 RPM.

OVER—INTERMEDIATE AND UNDERSPEED . . . Three S.P.D.T. switches to trip at three different speeds between 350 and 6,000 RPM.

Speeds above or below those listed above must be referred to our Engineering Department for special consideration. Request Bulletin 504 describing our Speed Sensitive Switches.

SYNCHRO-START PRODUCTS, INC.
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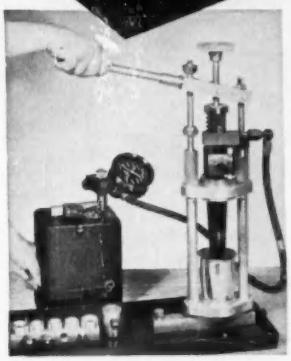
Automatic Engine Control Sets • Special Control Panels • Safety Alarm Sets • D.C. Solenoids • Heavy Duty Relays

For information write in No. 1118

KIENE® DIESEL **test**



EQUIPMENT FOR FIELD SERVICE . . .

Hydraulic Pump and Universal Unit Injector Test Stand gives on the job diagnosis for quick repair!

With the Kiene portable hand-grip hydraulic test pump and universal test stand you can make all conventional nozzle tests — plunger and bushing tests on all General Motors unit injectors — plus having many new and exclusive test features not found in existing tools. This compact, rugged and revolutionary design gives field servicing new accuracy and scope — speeds repair of diesel rigs with less down-time delay. All sizes connector nuts available.

Write for Bulletins KTP-50 and UTS-10

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

For information write in No. 1119

pays to know exactly what's wrong before you start—especially if you can find out with everything still on the engine, in the field. **1167**

Fleet Lube Program

Kendall Refining Co. has issued a bulletin entitled the "Kendall Fleet Lubrication Program," which they subtitle, A Proven Contribution to Lower Operating Costs. This bulletin lists their four-drain test procedures that help you establish proper oil drain periods, as well as a listing of their Kenlube greases that includes exactly what they are and exactly what they do. Of even more interest is the record-keeping forms and systems that are shown, to help fleet owners increase operating efficiency. Streamlining paper work is one of your best bets to lower your costs because it lets you know exactly where your dollars are going. **1168**

Metered Oil Distribution

Trabon Engineering Co's bulletin 6104 describes the operation of their "MV" oil lubrication systems. These systems provide pressure lubrication to any desired number of outlets, and in many gas engine and compressor installations can cut the number of pumps required. Systems provide adjustable flow, and either visual or electrical trouble warning. **1169**

Horizontal Core Heat Exchanger Catalog

Young Radiator has released a completely revised horizontal cooler and condenser catalog, a 16-page 2-color version with complete information for the cooling and temperature control of oil, water and gases, and for condensing vapors. Contains design features and full-page cut-aways. Also, dimensional drawings and specification data. **1170**

Compact V-Belt Drives

Dodge Manufacturing's 42-page illustrated handbook explains the workings of their newest line of V-belt drives consisting of narrower and more powerful belts for virtually all industrial applications, ranging from fractional to 1500-hp. One section is devoted to explanation, charts and monographs useful in designing special drives. Bulletin A695A is free for the asking. **1171**

I-R Starter and Tool Data

Ingersoll-Rand has sone new brochures you'll want for reference. One entitled "Go Modern Start With Air" makes a strong case for air starting through a variety of case histories, gives system data and other reference material. Companion piece is an air starter selection list in which specific recommendations are made for specific diesel engines.

Another booklet covers their broad line of air and electric Impactools. If you're running anything from head bolts to wheel lugs by hand, you're wasting time and not getting the job. The full line of tools, sockets and accessory kits is detailed. There's also a companion piece to this booklet—one packed with tips on how to maintain these tools and keep them operating at top efficiency for long periods.

Use the Reader Service card to get your copies. **1172**

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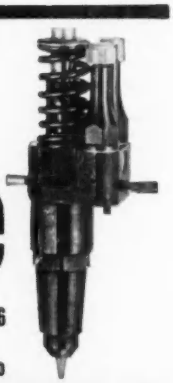

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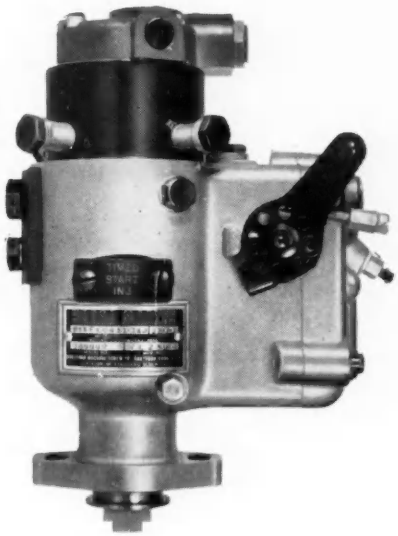

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